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GEOGRAPHICAL NATURE STUDIES



FRANK OWEN PAYNE

AMERICAN
NEW YORK

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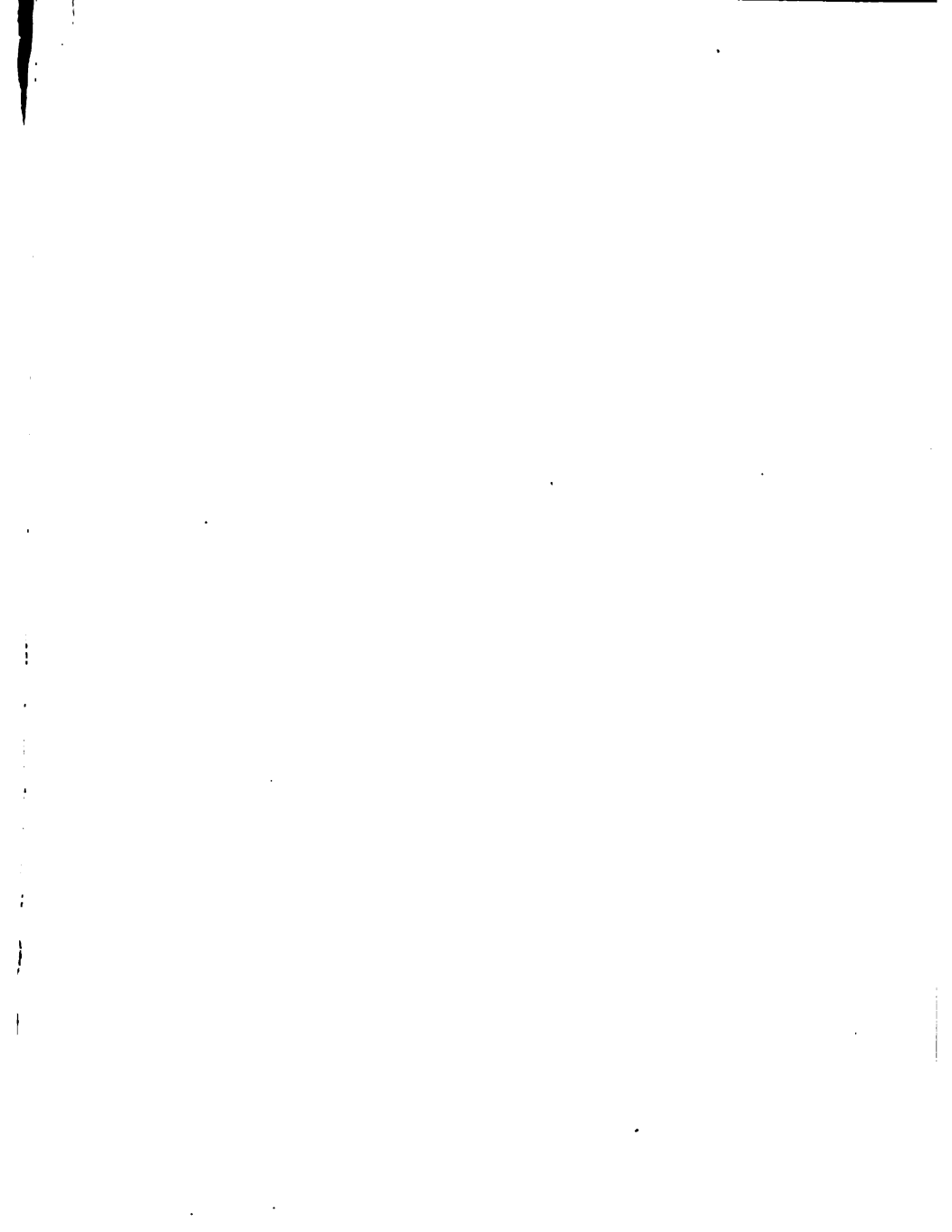
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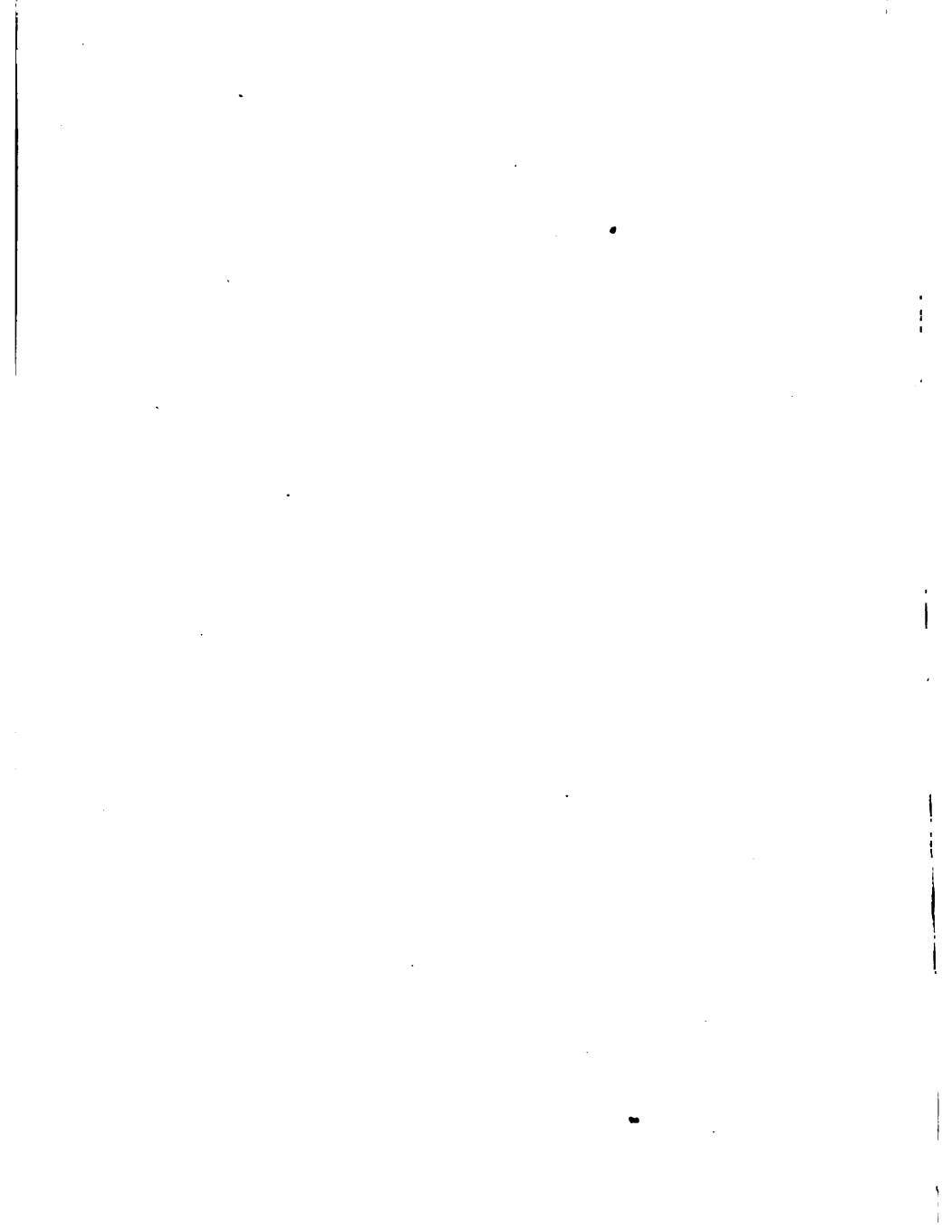
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° GEOGRAPHICAL
NATURE STUDIES

FOR PRIMARY WORK IN HOME GEOGRAPHY

BY

FRANK OWEN PAYNE, M.Sc.



NEW YORK ·· CINCINNATI ·· CHICAGO
AMERICAN BOOK COMPANY

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GEOG. NAT. STUDIES.

E-P 3

PREFACE.

No two subjects of study in the primary grades are more closely and naturally correlated than Nature Study and Observational or Home Geography, for all phenomena within our ken, whether they have to do with man or nature, may be classed under some aspect of the many-sided and comprehensive science of Geography.

In the first three school years these subjects are often taught orally; but with most teachers such oral instruction involves an undue amount of labor in preparing the lessons, and not infrequently leads to but vague and unsatisfactory results.

This little reading book for primary pupils is designed to lighten the work of the teacher, and by pointing out the often unrecognized relations between familiar phenomena and Home Geography will guide the study of the class to definite and practical ends.

The various lessons are adapted to the comprehension of the youngest pupils, and are calculated not only to cultivate habits of accurate observation, but to stimulate a desire for more knowledge and broader views of the world about us. They lead directly up to the point where the more formal study of geography from a text-book begins. The form and construction of these lessons is such that they may be used both as reading exercises and also for topical recitations.

The questions and language work occasionally introduced are designed to assist in cultivating the power of correct verbal expression in the statement of facts. They are for the most part suggestive

rather than exhaustive, and it is expected that the teacher will extend this feature of the work by introducing many additional exercises of the same sort.

The knowledge gained and the habits acquired through these foundation studies ought to make it possible for the child to begin the study of elementary geography at an early period; and it is confidently believed that they will enable him to pursue that study with a zest and appreciation which would otherwise be wanting.

The author desires to acknowledge his obligations to Russell Hinman, author of "Eclectic Physical Geography," for valuable aid in the way of plan and subject matter; to Matilde Coffin of Detroit, and Ellen Kenyon-Warner for helpful suggestions; and especially to Emily G. W. Rowe of Akron, Ohio, for poems signed with her name.

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GEOGRAPHICAL NATURE STUDIES.



LAND AND WATER.

When we go out of the house, upon what do we walk? Do we always walk upon the ground? How does the ground feel under our feet? Why do we not sink into it? Do we ever come to something on the ground which is not hard or solid, and upon which we cannot walk? What makes these puddles of water on the ground?

We often call the ground land. Wherever we go we shall be either upon the *land* or upon the *water*. We can walk upon the land because it is solid. If we should try to walk upon the water, we would sink down into it. Then, if we could not swim, we might be drowned.

Copy the following sentences, and fill the blank spaces with the right words :—

We walk upon the ——. We cannot walk upon the ——. The land is ——. Water is not ——. We sink into —— if we try to walk upon it. Some people can —— in the water. Everybody can —— upon the ——. Wherever we go, there is either —— or ——.

THE WATER UPON THE LAND.

When rain falls upon the ground, what becomes of it? Why does the water gather here and there in puddles? Do these puddles fill the road? Why not? Does all the water on the surface of the ground stand in puddles or pools? Why does some of it run along in streams instead of standing still in pools?

Yes, the water runs away because the ground is not even. The land is lower in some places than in others. The water runs down the slope from the higher land to some lower place.

Why does the puddle not run away, too?

That is right. It is because there is no slope from the puddle to some lower place. The water stands in the puddle because the land is higher all around it. We say it is dammed up so that it cannot flow away.

Did you ever make a dam across the gutter? How did you do it? See these children making a bank of sand and stones across the little stream. See how the water becomes wider and higher until it runs over and washes the dam

away? When the children are making a dam they are building a slope across the stream to keep the water in. But they cannot make it high enough and strong enough to stand very long.

Let us think, now, of what we have learned.

We have learned that
in moving about from
place to place, we



"They are building a slope across the stream."

walk upon solid ground. No matter how far we go, we find either land on which to walk or water on which we cannot walk. If the water is surrounded by land, so that it cannot flow away, it will stand in a pool. If there is a slope to a lower place, the water will flow down that slope.

THE CHILDREN IN THE RAIN.

Out in the rain, with wind-kissed cheeks,
Mabel, and Bessie, and Little Boy Blue
Were making a world of water and earth
Planned like the maps in the books they knew.

A mimic ocean was hollowed out,
Where winding rivers and brooks might flow;
Ranges of mountains stretched by the sea,
And islands dotted the bay below.

"The rivers are running too fast!" cried Bess,
"Our ships will be ruined, what shall we do?"
"Bring heaps of dirt from the old sand bank,
And make a dam," said Little Boy Blue.

In to dinner went laughing Bess;
Boy Blue and Mabel followed her call;
The rain poured down in a torrent wild,
And away went dams and ships and all!

Islands and capes were washed away,
The whole world was wrapped in a raging flood,
And when, next morning, the sun came out,
A desert stretched where their ocean stood.

— E. G. W. ROWE.

THE AIR.

Let all sit up very straight. Place your feet flat upon the floor, and throw your shoulders back. Shut your lips close together and breathe in while I count "One — two — three."

What did you do? What happened when you breathed? What passed through your noses down into your lungs? How do you know that *air* went in? Could you see it? No, but you felt it passing through your noses. Could you not also feel that something had gone into your lungs to fill them so full? Where does this air come from?

Yes, it is all around us. Every time we take breath, air enters our noses and is drawn into our lungs. We cannot see the air, but we know that there is air, because we can feel it, and because when we breathe it into our lungs, our chests become larger.

Did you feel your chests becoming larger when you breathed just now? Try again to see.

The Air Moves. — Air is all about us. The land and the water are covered with air. How high do you think it goes? Can you give a

reason for thinking that the air is among the tree tops? What do we say when the branches of trees sway to and fro?

Yes, we say that the wind is blowing. We can hear it in the tree tops. What is wind?



"How fast the clouds are sailing!"

It is moving air. We say wind is air in motion. How may we know that the air is as high as the clouds?

Let us go to the window and look out. See

the clouds in the sky. What are they doing? Why do you think they are moving? What makes them move? The wind is driving the clouds. See how the wind is tearing the edges of those big white clouds!

How fast the clouds are sailing! The air must be higher than the clouds. I wonder how high it does go. It certainly goes up much higher than the highest clouds.

The Air has Color.—Now while we are at the window, let us look far away at the trees over yonder against the sky. See how blue they look. They look blue because the air is between them and us. We see those distant trees through a great deal of air. The air has color, then. Its color is blue.

Air is everywhere. No matter where we go, on land or water, we shall find air over us and all about us. We could not live without it.

The air is thin and light. It moves about freely. When in motion it is called wind. The air extends high above us. The clouds float in it. Distant objects look blue because the air is blue.

THE SUN AND THE AIR.

Is the air cold or warm to-day? Is it warmer at night, or during the day? Is it warmer in the early morning, or at noon? On which side of the schoolhouse is it warmer, on the sunny side or on the shady side?

Tell how the air is heated.

It is heated by the sun. It is the sunny side of the house which is warmer; and when the sun shines highest in the sky we have the warmest part of the day. When the sun does not shine it is colder. Night is colder than day, because the sun is not shining then.

Wherever we go, we may be sure that the air will be above us and around us. We shall see clouds sailing over us, and we shall feel winds blowing. If we sail upon the water, the winds may help to make us go faster. The sun will shine upon us, and the air will hold the heat of the sun for us. Why is the air warmer in the sunshine than it is in the shade?

Yes, the air is somewhat heated by the sun-

beams, and it does not cool off very quickly. The air is really a great heat holder. If the air could not hold heat, everything would be frozen even in summer. Are you not glad that the air protects us in this way?

Let us think of some things we have learned: The land is a solid. How do we know it is a solid?

Because we cannot sink into it. It holds us up.

Water is a liquid. How do we know it is a liquid?

It moves about freely. It can be poured.

But air is neither solid nor liquid. It is much thinner than liquids and moves even more freely. We call such a substance *a gas*.

Write answers to these questions:—

Where is the air? How do you know that there is air? How do you know that the air moves? What is air in motion called? What heats the air? Is the air as warm at one time of the day as at another? At what time of day is it warmest? How does the air protect us from cold? Why does a gardener cover young plants when they are first set out? Why does he cover plants in the cool nights of fall? What is a cold frame? Why will plants grow in a cold frame earlier than in the open air?

CLOUDS.

Clouds that wander through the sky,
Sometimes low and sometimes high,
In the darkness of the night,
In the sunshine warm and bright;
Ah! I wonder much if you
Have any useful work to do.

Yes, we're busy night and day
As o'er the earth we take our way,
We are bearers of the rain
To the grass, and flowers, and grain;
We guard you from the sun's bright rays
In the hottest summer days.

— ANNA K. EGGLESTON.

WATER IN THE AIR.

Did you ever see a cloud in the house? No?
I will make a fine white cloud for you. Let us
take a tin can or a teakettle. Put a little water
into it. Place it over the lamp or upon a hot
stove.

Oh, you know what will happen! Yes, we
shall have a fine white cloud in a very short time.
Did you ever see such a cloud before? At home,

in the kitchen, you have often seen such clouds coming from the teakettle.

Is the cloud close to the spout? No, it is a short way from the end of the spout.

We cannot see anything between it and the spout.

What is this white cloud? It is made up of little drops of water.

Where does it come from? It comes from the boiling water. A part of the water has risen in tiny vapor drops called steam, and has escaped through the spout.

If it has come through the spout, how is it that there is no steam close to the end of the spout?

There *is* steam close to the end of the spout, but the vapor drops are so tiny that we cannot see them. They are scalding hot there; but when they get a little way from the spout they begin to cool, and float together into larger drops of water which we can see. These form the white cloud floating in the air.



"What is this white cloud?"

Take a piece of cold glass. Hold it in a jet of steam. See how wet the glass has become. The cold glass has cooled the steam and changed it back to water.

The clear moisture like that at the end of the spout is called *vapor*, and we say it is invisible because we cannot see it. When it cools off so as to be white, like the cloud, we say it is visible moisture.

The little drops of water which form the white cloud are so very small that they float in the air. But what becomes of the little cloud? In a little while it begins to melt away. Soon we cannot see it at all. The tiny particles of water are still in the air, but they have been scattered far apart; and they are so small that we cannot see them unless many of them are close together. And so the visible moisture has been changed back to invisible vapor.

What was that upon the glass? Yes, it was visible moisture, for it could be seen.

Are the clouds in the sky visible moisture or are they vapor? Do you think that all the moisture in the air is in the clouds? We shall see.

GETTING MOISTURE FROM THE AIR.

Fill a thin glass tumbler with finely crushed ice. See the outside of the glass. It is getting wet. It is doing as the ice pitcher does in summer. Where does this moisture come from? It cannot leak through the glass. It must come from the air.

What happened when the cold glass was held in the jet of steam? Why? It is so also with the glass of crushed ice. There is invisible moisture in the air, and when this moisture becomes chilled by the cold glass, the vapor particles of which it is made up are brought closer together, and it changes to visible moisture which we see in the form of little drops of water upon the outside of the glass.

There is invisible moisture in the air all around us. That is why, after a cool night, we find dew on the cold plants. Did you ever see the beautiful dewdrops sparkling on the grass in the morning?

A million little diamonds
Twinkled on the trees,

And all the little maidens said,
“A jewel, if you please!”
But when they held their hands outstretched
To catch the diamonds gay,
A million little sunbeams came
And stole them all away.

The air always contains moisture. When it floats high over our heads in masses that we can see, we call it clouds. When clouds settle down upon the land, they are called fog. When clouds become very thick, the little drops of water in them unite with one another to make larger drops. These drops are so heavy that they cannot float in the air, and so they fall rapidly to the ground. This is what we call rain.

Dew sometimes forms in cold nights and freezes as it forms upon plants. It is then called frost. The moisture of the clouds often freezes in the form of beautiful stars or soft flaky masses called snow. Sometimes the winds blow the snowflakes around and roll them together into little balls; then these are partly melted, and frozen again into hard little balls of ice. These ice balls are called hailstones.

THE MESSAGE OF THE SNOWFLAKE.

“The snowflake kissed me,
As on it sped,
And told me a story,”
The little maid said.
“I didn’t mind it,
So soft and cold,
And here is the story
The snowflake told.

“‘You won’t believe it,
I almost know,
But I was a raindrop
Before I was snow.
I fell by the roadside,
And there I lay,
Till the sun drew me up
Through the air one day,

“‘On a cloud I floated,
Till cold I grew,
Then I turned to a snowflake,
And flew down to you.
And this is my message,
So sweet and sure :
Be pure, like the snowflake,
Be pure, be pure.’” —E. G. W. R.

WHERE THE RAIN COMES FROM.

Where does all the moisture in the air come from? Let us see. Suppose we take a small dish of water and put it on the window sill in the sun. After a while, if we look at the dish, we shall find that it is dry. Where is the water?

Yes, it has dried up. The heat of the sun has



"It comes from the clouds."

changed it into vapor, just as the heat of the lamp changed the water into vapor awhile ago. This vapor has gone into the air, leaving the dish dry. The water which was in the dish is not lost. It has only changed its form from water to vapor.

Much of the water which falls upon the ground or stands in puddles thus passes into the air as vapor. You have often seen how these puddles dry up after the rain is over and the sun has come out again.

Now, where does the rain come from? It comes

from the clouds. The clouds were once vapor in the air. The vapor came from the water which was once flowing over the ground or standing in pools and puddles.

Much of the rain that fell to-day is rising in the air as vapor. The particles of this vapor by being cooled and brought closer together will become visible clouds or fogs. By being brought still closer together they will form into drops and become rain or dew, or into icy flakes and become snow, hail, or frost.

In what forms is the water in the air? How does the air get this moisture? How can we get moisture out of the air? What is vapor? On what kind of nights does dew collect?

THE LIFE OF A DEWDROP.

Clear, shining, and bright, a dewdrop lay
In the silent heart of a rose;
Where did the dewdrop come from,
And where will it go when it goes?

Purest of water, the dewdrop
Is drawn from the summer air,
And because the grasses and flowers are cool
Is the reason it gathers there.

This little dewdrop lay in the rose —
 Could it have a daintier bed?
 All through the quiet night time,
 Till the sun rose up and said:



“Good morning, shining
 dewdrop!”

Then it stirred with a
 frightened start,
 For the loving kiss of the
 summer sun

Will break a dewdrop's heart.

Up, up through the shining pathway
 That led to the higher air,
 The pure and pearly dewdrop
 Followed the sunbeam fair.

A great white cloud enwrapped it,
 And when it fell again,
 It was no more a dewdrop,
 But a drop of summer rain.

— E. G. W. ROWE.

Of what is a dewdrop made? Where does the dew come from? Why does it collect upon the grass and flowers? How long did the dewdrop lie in the rose? Who woke it? Was this drop visible as she went up the “shining pathway”? How did the dewdrop change?

THE SEASONS.

What do we mean when we say the weather is pleasant?

We use the word weather in speaking of the air whether it is hot or cold, wet or dry. Thus we hear people say: "This is damp weather," or "This is the hottest weather we have had." What kind of weather are we having to-day? We also speak of cloudy weather, stormy weather, foggy weather, and rainy weather.

We have many kinds of weather, but certain kinds usually come at about the same time of the year. The year is divided into four equal parts. We call these parts seasons.

Do you know the names of the seasons? They are: Spring, Summer, Autumn, and Winter.

In spring everything is beginning to grow. We call it spring because plants are springing from the soil. In spring the weather is mild. At first it is cool, but it becomes warm at last. In spring there is usually much rain.

After spring comes summer. Summer is the hot season. In summer the days are long and

very hot. The summer nights are warm and short. In summer there are many flowers. Boys go swimming when the days are long and hot. The frogs croak during the short summer nights.

In autumn the weather begins to grow cooler. The nights become longer. Frosts begin to nip the trees, and the leaves turn yellow and red. The fruit ripens, and all the crops are gathered in. Autumn is also called fall because the leaves fall at that time. Autumn is opposite to spring. It begins warm and gets cooler, until at last the ponds begin to freeze over.

Then follows winter. In winter boys and girls go skating. Christmas comes. The days are short, and the nights long, and oh! such cold weather! Now for snow and sleds and the best fun of the year!

THE MONTHS.

Each season has three months. The spring months are March, April, and May. In March there is much windy weather. April is rainy; and May is a sunny month. We gather wild flowers in May.

The summer months are June, July, and August. Roses bloom in June. July is the month of harvest. On the 4th of July we shoot fire-crackers and burn fireworks. Why do we do this? In August the days are generally hot and dry, but the nights are often cool.

September, October, and November are the months of autumn. In September school begins. In October we gather red-cheeked apples from the orchard, and nuts from the woods. In November comes Thanksgiving Day.

December, January, and February are the winter months. Winter is cold because the days are short and we get less heat from the sun then. In summer we get more heat from the sun because the sun is then higher in the sky.

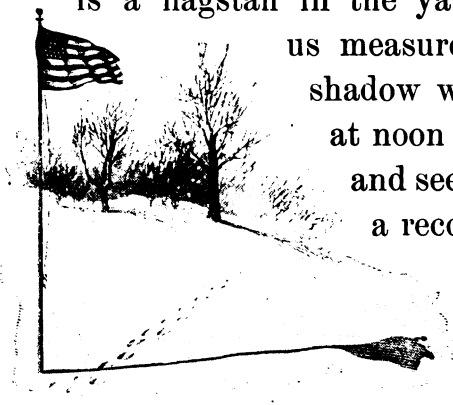
At what time of day is the sun highest in the sky? When is it lowest? When is it hottest?

You see that the hottest part of the day is when the sun shines highest in our sky. Now as the year goes by, the sun rises and sinks in the sky. In summer it is highest. Then we have the hottest weather. In winter it is lowest. Then our weather is the coldest.

Let us plant a pole in the school yard. If there is a flagstaff in the yard, it will do. Let us measure the length of the shadow which the pole casts at noon once or twice a week and see how it varies. Keep a record of the length of the shadow and the dates when the shadow was measured. You

will soon see that the shadow changes a little each day. It will be longest in winter because the sun is lowest then, and shortest in summer because then the sun is highest in the sky.

Name the seasons. In what seasons do boys go swimming? In what season does Christmas come? Name the months of each season. How many seasons are there? How many months in each? That makes how many months in the whole year? In which season do wild flowers



bloom? In which do peaches ripen? In which season are the trees without leaves? In which season do strawberries ripen here?

SUGGESTION. — It may be useful to keep a record of the conditions of the weather for a week or two, the pupils making the observations and taking note of: (1) temperature, (2) cloudiness, (3) the wind and its direction. These may be tabulated either upon the blackboard or by each pupil upon paper.

THE ENDLESS STORY.

A tiny drop of water
 Within the ocean lay;
 A coaxing sunbeam caught her
 And bore her far away;
 Up, up, and higher still, they go,
 With gentle motion soft and slow.

A little cloud lay sleeping
 Upon the azure sky;
 But soon she fell a weeping,
 As cold the wind rushed by,
 And cried and cried herself away —
 It was a very rainy day.

The little raindrops sinking,
 Ran trickling through the ground,
 And set the brooklets drinking

In all the country round ;
 But some with laughing murmur said,
 " We'll farther go," and on they sped.

A little spring came dripping
 The moss and ferns among,
 A silver rill went tripping
 And singing sweet along,
 And calling others to its side,
 Until it rolled — a river's tide.

And with the ocean blending
 At last its waters run.
 " This is the story's ending ?"
 Why no ! 'tis just begun ;
 For in the ocean, as before,
 The drop of water lay once more.

— A. K. EGGLESTON.

Tell this story in your own words. Was the tiny drop alone ? Was she visible as she went up with the coaxing sun-beam ?

Did you ever see the " sun draw water " ? What made the little cloud weep ? What kind of noise does the rain make in falling ? What makes the brooklets murmur ?

Did you ever see a spring ? Describe it. Where did the water in this spring come from ? Where does the water in the rivers go ? What is the ocean ?

WHAT THE RAIN DOES.

See how it is raining! Just hear the rain as it pours down! See the large drops falling down before the windows.

What does the rain do when it strikes the sidewalk? What will raindrops do when they fall upon the dusty land?

Each drop will pick up a little dust. What will happen then?

Yes, it will begin to run away.

Why does the rain run along on the ground? Why does it flow in that direction instead of any other?

Yes, it is because the land slopes down that way. Every raindrop is a worker. When a drop strikes the ground, it picks up all the dust it can carry and runs down the slope with it.

Look out and see how the water is flowing. Does it flow towards the schoolhouse or away from it? Why? Where does it go then? Why?

Which way does the water flow in the gutter? Why? We shall soon learn more about what water does.

SURFACE.

If the surface of the ground were quite flat, the water would lie upon it or soak into it. But the land surface is seldom perfectly level. It usually slopes more or less. We cannot always see that it slopes.

Even in cities, where the streets seem to be flat, you can see the water flowing from the middle of the street to the sides. It does not stop when it reaches the sides either; for, if you will look, you can see it flowing along in the gutters.

We call sloping land a *slope*. The water flows down a slope until it comes to the bottom. The bottom of a slope is the place where the ground stops sloping downward and begins sloping upward again. When you slide down hill in winter, the sled stops at the bottom where the land begins to slope upward again. It is the upward slope that stops the sled. So when the water has been running down a slope and has come to such a place, it stops just as a sled does. Then the water must turn in its course or spread out in a pool.

Part of the water that falls upon the ground runs off down the slopes. There is another part that sinks into the ground, and a third part that changes to vapor and rises into the air again. We shall learn more of this after a while, but the part which we see runs down the slopes.



SLOPES.

I am going to take a walk to-day. Will you go with me? We shall walk down the slope



"We call sloping land a *slope*."

where we saw the water flowing. The water must run down the slope. The slope tells the water which way it must go. We shall let the slope tell us which way to go to-day. We shall be like little drops of water, and so we must go down the slope. Then we can see where the water goes.

Here is the bottom of the slope because the surface changes. It slants from a downward to an upward direction. Do you see why we so often find a stream at such places?

It is because the slopes on both sides drain towards each other. This makes the water collect at the bottom of the two slopes. When the water reaches the bottom of these slopes, it either stands still in a little pond or else it runs along in a trough formed by the meeting of the slopes. If the slope forms a little bowl, the water forms a pool because it cannot get away. On page 41 is a picture of such a pool in the woods. See how clear the water is. Perhaps there are fishes in the quiet pool. If the slopes are not like a bowl, but like a trough, the water turns and runs along in the trough.

Here is a picture of a scene in the country. See the farmhouse and barns on the left side



"A scene in the country."

of the picture. There are other farms away back in the distance. The land is rolling here. See where there are pools of water on the ground! Do you not see that these pools lie where the hollows are? There are gentle slopes here and there. The water flows down them, and so collects in the lowest places between these slopes.

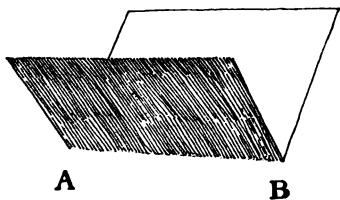
How many pools do you see in this picture? Yes, there are three large pools and some smaller ones. After a while the sun's heat may make these pools dry up, and then the soil will be dry, too.

Why does the water collect in some places? Why does it change its course? What becomes of the pools which form during a rain storm? Where do we usually find streams?



VALLEYS.

Two downward slopes which meet form a valley. You can remember this word *valley* because it begins with a letter "v," which is formed like a valley by the meeting of two side slopes.



Take a piece of paper and fold it thus. We have made two slopes which meet along the line *A-B*, where you folded the paper.

If this were made of tin instead of paper, we could pour water on the sides, and it would run down them just as it does down the slopes of a real valley.

The sides of a valley are sometimes very steep. If the side slopes are very wide and almost flat, we say they form a plain.

Plains are such gentle slopes that they seem to be quite level. Sometimes they are many miles wide and so nearly level that you cannot see that they slope at all. Sometimes the side slopes of a valley are so steep that it is very hard to climb up them.



Fold your paper as it is in 1, 2, 3, 4. These show some of the ways in which valleys slope.

On the next page is a picture of a valley with gently sloping sides. We are near the top of one of these slopes, and we are looking across this broad valley. Do you see how the land slopes down from us?

See how it goes up again on the other side! There is a little brook down in the lowest part of this valley. It runs along singing merrily. When it rains, the little rills run down these



"A valley with gently sloping sides."

slopes and feed the little brook. But to-day the sun is shining, and the brook runs along very merry and bright.

There are farms and groves on the distant slope. Down near the brook the slopes are more gentle and the soil is more fertile. Up on the slope nearest us, the soil is drier than it is down in the valley. See the large stones on the ground near us. The lighter soils have been washed down the slope, leaving these boulders behind.

In the next picture is shown a valley with steep slopes. See the water in this valley. In one place there is a row of big stones crossing the stream, and people who wish to cross from one slope of the valley to the other may step on them. How steep these slopes are! It is not possible to climb such steep cliffs. Even plants cannot grow on these slopes. Sometimes huge masses of rock and soil fall from the tops of such cliffs and lie at their bases.



"A valley with steep slopes."



"Are the slopes which you see gentle or steep?"

Here is another valley, and through it flows a great river. See the boats sailing upon it. At the bottom of the slope where we are standing there is a place where boats can stop. There is a boat there now. Some day we shall take a ride on this boat. Are the slopes which you see gentle or steep?

What valleys are near you? Have they steep or gentle slopes? Is there a stream in any of these valleys? If not a stream, is there a pond? If the valleys near you have no streams or ponds in them, tell what you can of the soil of these valleys.

PLANTS OF THE VALLEYS.

Let us go to-day into the valley to see what can be found there. We will go first to the lowest place, down where the slopes meet. There is a little brook there, and perhaps we shall find a pool. In places where the soil is too soft to hold the water, we shall find it moist from the drainage of the side slopes.

What do we find growing down here in the valley? Ah! here are watercresses growing in

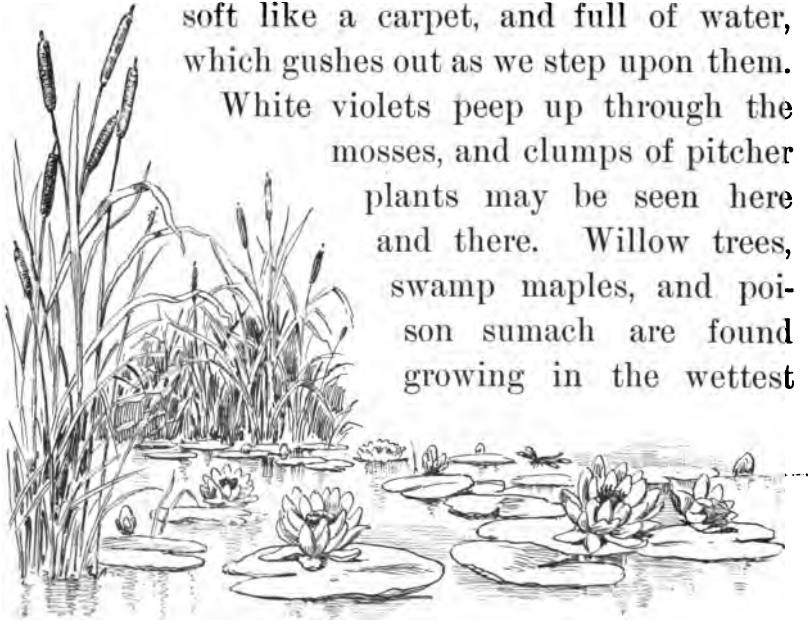


"Perhaps we shall find a pool."

the clear, running water, and ferns and skunk cabbages in the soft, dark muck. See, here is a jack-in-the-pulpit, and there are white and purple trilliums. How rank the grasses and sedges grow here! Over yonder, where it is too wet for one to go, are yellow marsh marigolds which children call cowslips. And there in the quiet pool grow tall cat-tails and graceful iris. They are children of the valley standing knee-deep in the water. Here are green mosses,

soft like a carpet, and full of water, which gushes out as we step upon them.

White violets peep up through the mosses, and clumps of pitcher plants may be seen here and there. Willow trees, swamp maples, and poison sumach are found growing in the wettest



places. White and yellow water lilies are seen growing in the water, with their leaves floating upon its surface. Cranberries, too, prefer the



Watercresses.

mossy bogs, and so do orchids.

Why do these plants grow here?

Yes, these plants like plenty of water. They cannot live in dry places. We always find such plants growing in very wet soil.



Jack-in-the-pulpit.

Where do you go for huckleberries? Where do you go for water lilies? What plants have you seen growing in wet places?

What do you know about cranberries? What poisonous plant grows in wet places? Why is the vegetation so rank down in the valleys? Why do willows and swamp maples grow in valleys? Why will not cranberries grow well on hill tops? Name two plants which grow in the water. Where do you go to gather cresses? Why are swamp grasses and swamp sedges more rank than other grasses and sedges? In what soil do we usually find cowslips growing? Where are the roots of the water lily? Collect and study arrow-weed, pond-weed, and sun-dew.



Pitcher Plants.

ANIMALS OF THE VALLEYS.



"It is a muskrat."

Hark! what is that? It is a muskrat. He lives in a hut which he has built in the water. In sunny places, turtles may be seen lying on the stones, sunning themselves. See how they slide off into the water

when they see us coming. If we look sharp, we may see a pretty brown lizard gliding over the soft green mosses to its hiding place.

See the minnows swimming in the brook! There is a green frog on that mossy stone. If we go near, he will leap into the water.



"A green frog."

There are some crayfish hiding among the pebbles in the brook. See them dart through the water.

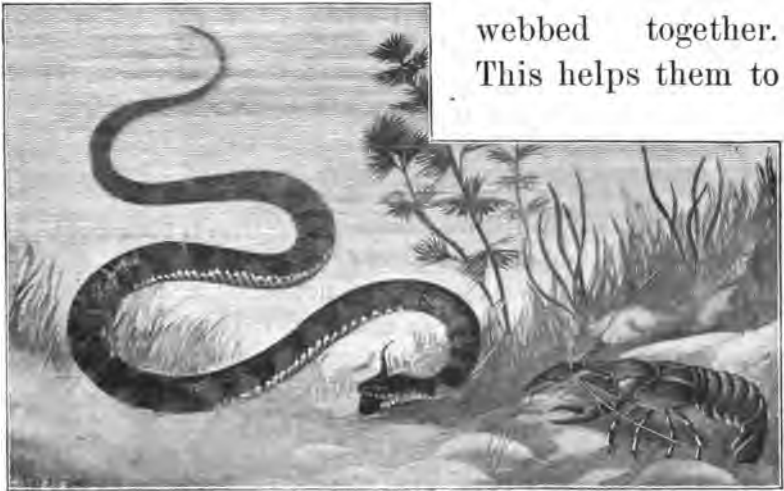
There are plenty of mosquitoes here, too, and dragonflies go darting about in search of food. There goes a snake into the water; he will not hurt us. He has a hole in the ground somewhere near here. See how well he can swim. He is a water snake.



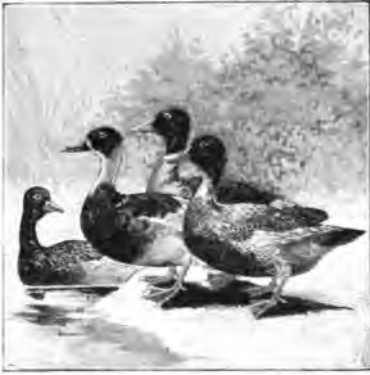
"Dragonflies go darting about."

Ducks and geese come to the pond to swim.

Their toes are webbed together. This helps them to



"There goes a snake into the water."



"Their toes are webbed together."

paddle through the water. Their flat bills help them to dig their food out of the mud.

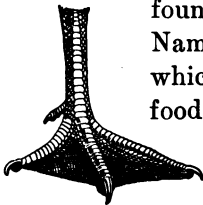
Snipes, cranes, and herons come here to wade. They are very funny looking birds. Their long legs make it easy for them to wade

out into quite deep water, and with their long necks and long bills they can reach far down after fishes and other food.



"Where do lizards live?"

What kind of birds live in the valleys? What is the food of these birds? Why do they seek it in the valley? What insects are found near the water?



A Goose's Foot.

Name some animals, not birds and not insects, which live in or near the water. What is their food? Why are there so many mosquitoes in wet places? What brings the dragonflies to such places? Name four living things which you have seen in the water. Which of these always live in the water? Which

sometimes come out and leap upon the ground? Did you

ever see a lizard? How many feet had it? Where do lizards live? On what do they feed? How does a crayfish move through the water? Why does the duck have webbed feet? What is the use of the snipe's long bill?

Feet of birds are clothed with scales. Wading and swimming would be very hard if the feet and legs were covered with feathers. Procure feet of various birds, — chickens, ducks, and turkeys, and study them as regards shape, size, position and color of scales, and number and position of toes. Compare feet of birds with those of turtles, frogs and lizards, as to number of toes and covering.



"Cranes come here to wade."



"The snipe's long bill."

Now let us repeat some of the things we have learned.

Wherever the soil is always wet, water-loving plants and animals are found living and growing.

We shall not always find the same plants and animals in such places, but we shall always find similar ones.

In some places the vegetation will be much larger and denser, and the animals will be much fiercer and larger, but they will be similar in most respects. Birds with webbed feet, and birds with long legs and necks commonly make their homes very near the water.



"Somewhat like . . . the roof of a house."

DIVIDES, HILLS, MOUNTAINS, PLATEAUS.

We have taken a walk down one slope, let us now go up another. Here is a picture of such a slope. Up we go, higher and higher. By and by we shall come to the top.

Ah, here we are at the top. At last we have reached a place where, if we go on any farther, we must go downward. It is somewhat like the highest part or ridge of the roof of a house.

What happens to the rain water falling here? That which falls on one side of the ridge will flow one way, that which falls on the other side will run the other way. The ridge of the house divides one part of the rainfall from the other part. What shall we call a ridge of land which divides the waters in this way?

Yes, we will call it a *divide*, or *water parting*, because it parts or divides all the water falling upon it.

You see that the roof of the schoolhouse is a sort of divide. It divides the rainfall into two parts. One part flows down one roof slope; the other flows down the other.

If the slopes of the land are steep like those of the roof of a house, we call the line where they meet a ridge, because it is so much like the ridge of a roof. If the slopes make a ridge which is not very high, we call it a ridge or range of *hills*. But when these slopes are very steep and long so as to make the ridge very high, we call it a range of *mountains*.

Sometimes the high land near the top of the slopes is not at all steep, but is almost flat like

the top of a table. We call such high, almost level slopes, *table-lands*, or *plateaus*.

Have you ever seen a mountain? Here is a picture of one. See how steep the slopes are.



"Have you ever seen a mountain?"

How very high this mountain must be! It is higher than the clouds. Think what a long, hard climb it must be to reach its top.

In this picture we see a man on horseback. On the man's right there is a deep valley, but on his left there is a wall of rock. How steep the slopes are! Do you think that his horse can climb to the top of this high mountain?

You have all seen hills. Is there a hill in the neighborhood of your home? Is it a high hill? Does it belong to a range of hills?

Let us see what we have learned. The meeting of two upward slopes is a divide. If these slopes are short and not very steep, they form a range of hills. Very high hills are called mountains. Mountain slopes are usually steeper and longer than hill slopes.

Plateaus often border mountain ranges. Hills and mountains are great piles of soil and rock. Valleys are hollows where the rock has been washed out. Hills and mountains shed the water falling upon them, like a roof. Valleys collect this water and carry it away, or hold it in pools.



PLANTS OF THE HIGHLANDS.

As we go up the slopes, the land naturally becomes drier and less rich, because the light rich loam has been washed down into the valleys, and less water sinks into the steep sides as it runs swiftly down. We shall not see our old friends the trillium, the jack-in-the-pulpit, and the



Golden-rod.

marsh marigold up here. The slopes are too dry and stony for such plants to grow. They cannot leave the moist places down in the valley where we saw them growing.

But we shall find other plants quite as pretty but not so plentiful.

Here grow the daisy, the buttercup, the arbutus, the violet, the dandelion, and many beautiful grasses.



The Daisy.

Later in the season we shall find the slopes covered with asters and golden-rods.

The willow is a great drinker.

He cannot live

on the dry hillsides, but

the slopes are not without their trees. Maple, oak, beech, ash, and linden grow upon the high lands. See how the checker-



Buttercups.



Violets.

berry creeps over the ground! See how the columbine and azalea brighten all the woods with their colors!

Farther up, where the soil becomes drier, we find laurel and hazel. Here, too, in the early spring, the trailing arbutus may be seen, covering the ground with large patches of pink flowers. On the broad, gentle slopes are fields of corn, wheat, and other grains.



Laurel.

Still higher, where the surface is dry and rocky, pines and spruces grow. Farther up the slope there are only a few stunted plants peeping out from among the stones. The rocky summits will be found almost bare, covered here and there with patches of dry mosses and lichens.



Arbutus.

Write answers to these questions : —

What plants grow on the slopes?

Are they water-loving plants? Name

five trees which you have seen growing on the slopes. Where does arbutus grow? Where do lichens grow?

ANIMALS OF THE SLOPES.



A Squirrel.

What animals do you expect to find living where the nut trees grow? Yes, here is the home of the squirrel. Nuts are the squirrel's food. He makes his home where he can get them.

Field mice,

chipmunks, and rabbits live on the slopes.

Weasels and ferrets make their homes in the thick forests.

Skunks and opossums are seldom



Deer.

seen by day, but they make their homes on the wooded slopes.



A Bear.

Far away from towns live bears, wolves, foxes, and many kinds of deer. Sometimes bears are

caught when very young and tamed. Then they may be taught many funny tricks. We sometimes see them led about the streets. Bears are fond of climbing.

Wolves and foxes look very much like dogs. They cannot climb trees as bears can. The fox is sly. He likes to rob the farmers' hen roosts. Among the trees live many song birds.



A Robin.

Robins, wrens, sparrows, and hosts of other birds build their nests among the branches.



Jay Birds.

Write answers to these questions : —

Where is the squirrel found? Why does he live there? What do rabbits eat? Describe a chipmunk. Did you ever see a bear? What was he doing? Write three statements about foxes.

Name five song birds you have seen. Why do we set traps for weasels, foxes, and opossums?

HOMES OF PLANTS AND ANIMALS.

Plants and animals are always fitted for the place in which they live. The fishes have fins. The birds have wings. The cat has paws. The fish would get on very poorly if it had a shell like the oyster. A duck would make sad work swimming if her feet had no webs and were like the feet of a chicken.

Each creature is suited to its native home. Plants and animals which are fond of water must live where water is to be found. Plants and animals which need less water will live in drier places. So it happens that plants of the valleys differ greatly from those of the drier places farther up the slopes.

We have seen that the squirrel makes his home in the woods where the nuts grow. He wants to be near his food. Animals always make their homes near where their food is. The dragonfly lives where he can find the mosquito, his food. Birds with long legs usually live near the water because they can wade in the water and catch fish for their food.

No matter where we go, we shall always find it true, that the lowlands have ranker vegetation than the highlands. We shall also find that different kinds of plants bring different kinds of animals because these animals depend directly or indirectly upon plants for their food and shelter.



THE RAIN AND THE DUST.

When the rain water falls upon the slopes and runs down them, it does not flow in sheets, but in little streams. These may be very little indeed. Such streams are called rills or runnels because the water runs on the ground.

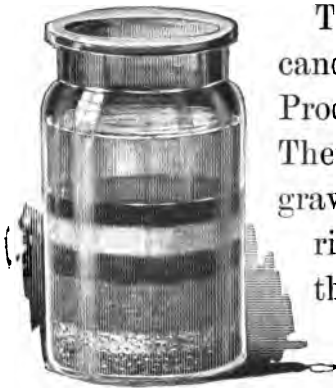
The water flows faster down steep slopes than it does down gentle slopes, just as your sled goes faster along the steeper slopes.

Is this water clear when it flows down a slope soon after a rain? See how muddy it is. Get a glass full of this muddy water and place it upon the window sill for a while. Pretty soon it will settle, and you will find the mud all on the bottom of the glass.

You have not forgotten how the drops of water

which fell upon the dusty ground, picked up little particles of dust. So it is with rain water falling upon the land. Each drop picks up as much as it can carry and runs away down the slope with it. If the slope be steep, it runs faster and can carry more. If the slope be gentle, the little runnel must go slower and so carries much less.

THE SORTING OF SILT.



"Take a large glass jar."

Take a large glass jar. A candy jar or fruit jar will do. Procure different kinds of soil. There should be coarse and fine gravel, sand, loam, clay, and rich vegetable mold. Put these in the jar and add a large quantity of water. Shake or stir and then set away on the window sill.

When the sediment has settled and the water above has become perfectly clear, examine and observe the arrangement of the soils which have been put into the jar.

Look at the glass jar on the window sill. The mud has settled to the bottom. Look closely at this mud. Where is the finest part; the coarsest part?

The coarsest part is at the bottom. The finer is above it. The finest is at the top.

The coarse part is heavier than the fine part. The water must drop the coarse part first, and then the fine part. It always happens so when the running water is stopped in pools. If you dig where such a pool has been, you will find the coarse gravel at the bottom and nearest the mouth of the inlet.

This is because the quiet water of the pool checks the flow of the stream. Finer gravel will be found above it, and sand or clay on the top, leaving the clear water above the muddy bottom. You can find layers of such mud at the bottom of every pool when the water has gone.

This sand or mud, brought down by the streams, is called *silt*, or sediment. Where the slopes are steep, the water runs fast and carries much silt, both coarse and fine. Where the slope becomes less steep, the coarse silt stops, and the

fine silt is carried farther on. Where the small streams flow into hollows and form pools or ponds, all their silt, both coarse and fine, must settle to the bottom.

Go out and see the rain at work. Raindrops



"The rills are the greater workers."

and rills are great workers, but the rills are by far the greater workers. Put on overshoes and carry umbrellas so that you need not get wet while seeing them work. Running water is never idle. Every part has some work to do.

Let us first go to where the water is dripping from the eaves of the house. How clean the large pebbles are! What has become of the fine soil? The rills made by the water that has fallen from the eaves have carried it all away.

Let us see if we can find where this fine soil has been carried. How small the rills are. Here

is one. See how yellow it is with mud. Here are others running down the slope towards the gutter carrying their load of fine sand and mud.

Each little rill carries all the silt it can. Small stones and pebbles are rolling along in the little stream where the slope is steep.

Now find a place where the slope is not so steep. Do you see any pebbles rolling along here? Why not?

Here is a place where the slope is so gentle as to seem flat. See what the rills do here. They drop all their load of silt, and it forms a mud bank. The water flows through this mud bank in many channels. Such places are called *deltas*, and you can find them after every rain storm.



THE WORK OF THE STREAMS.

This is not the only work of the streams. They are wearing out little channels in which to flow. How do they do this? The running water tears off tiny pieces of soil and carries them away. The rain has wet the ground and softened it so that the little rills can do this. The small grains

which roll along in the rill also help to loosen soil from the sides and bottom of the channel.

Streams are everywhere doing just such work as this. Up among the hills where the slopes are steep, the rills dig out so much silt that large stones become loosened. These stones roll down the bed of the streams. The rolling stone is carried here and there by the water, knocking against other stones until it becomes a smooth pebble.

So you see every little brook is a miller who grinds stones. The brook grinds off the rough edges of sharp stones and makes them into fine sand or clay.

Pick up some pebbles and pass them around the class. See how smooth and round they have become. Once they had sharp corners, but now they are smooth.

But the pebbles help the stream too. For as they are rolled along by the water, they rub on the bottom of the stream and loosen more soil. You have seen pebbles rolling along in a little stream. They were helping the little stream to dig out its channel.

Nature takes little rills and pebbles to help her in her great work. When the rills flow together, the stream becomes larger and so carries more silt. When the slopes are steep, the streams are bright and active. They work hard, rolling large stones and pebbles along and singing merrily at their work. But when they reach the gentle slopes, they act as if they were tired, for they run more slowly and drop first the largest stones, then the finer gravel, then the sand, and at last the finest particles of silt.

When the streams flow into a pond, they stop running forward, and then they drop all their load of silt; for the pond is their resting place where the water stands almost still. When the water at last leaves the pond by a single stream, it is pure and clear, and it flows on over its clean sandy bed, singing because that part of its work is done.

If we look into the gutter on the day after a rain, and see where the silt has been left, we shall always find that where the current has been checked, and a pool formed, a part of the silt has been dropped to form a layer of mud on the

bottom of the pool. We see then that soil is always being carried down the slopes from high lands to lower ones. This will explain why the mountain tops are often bare rocks and their



A Valley cut through a Plateau.

slopes become steeper, while the soil of the valleys becomes deeper and more fertile.

The rills wear away the soil and pick up little particles. They pass these on to the larger streams. These in turn carry the silt away. The slopes are wearing down — the steep slopes rapidly,

and the gentle slopes more slowly. Thus the streams are wearing down the high lands and carrying them away. They are therefore building up low places by filling up valleys with silt.

Streams may be said to be the enemies of pools because they try to fill up the pools where streams run in, and they also cut open the other

end so as to let the water out. We may be sure that wherever there is a stream it is doing just such work as this. Somewhere, back among the hills, the little rills and brooks are feeding it with silt to fill up the pools.

In the picture we see a valley which has been cut through a plateau by the action of streams. The high level land is the real level of the country. See how much work these streams have done in carving out these valleys.

Write a story about what a little rill did, telling where it came from, where it went, why it went there, and what it did on the way.

THE WORK OF FROST AND ICE.

Did you ever leave a glass of water in a cold room over night so that the water was frozen? What happened to the glass? Did you ever see a wooden bucket or a tub of water which had been left out of doors on a cold winter night? What happened to the bucket?

What is water changed into by freezing? When a bucket of water is frozen solid, does the ice rise just as high as the water did?

When water changes to ice it takes up more room than it did before. If it is in a small place like a bottle or a glass, it will often burst the sides. How powerful it must be to break such strong things.

What must sometimes happen when water freezes in a crack in the rock?

Yes, it sometimes splits huge rocks into pieces. Where there is a very steep hill of rock, you will always find many pieces scattered upon the ground at the bottom. These pieces were broken off by the frost. The frost helps the water to tear down the hills and build up the valleys.



THE VOYAGE OF A PEBBLE.

A great rock hung over a river
And looked down on the shining sands ;
It knew that the river journeyed
To the shores of distant lands.

And often it thought with longing
Of the world beyond its view,
And wanted to see what the river saw
And know what the river knew.

The frost, in the still, cold winter,
Had pierced its stony heart,
So, with the spring's first flood time,
The great rock fell apart.

And a piece of its shining granite,
By the river's current whirled,
With branches of floating driftwood,
Went out to view the world.

Round meadows and under bridges,
Past wood and glen and cave,
Its corners sharp were rubbed away,
By arch and stone and wave.

So the pebble was carried onward
To the sea it longed to reach,
And was thrown by a heavy breaker,
Upon a sandy beach.

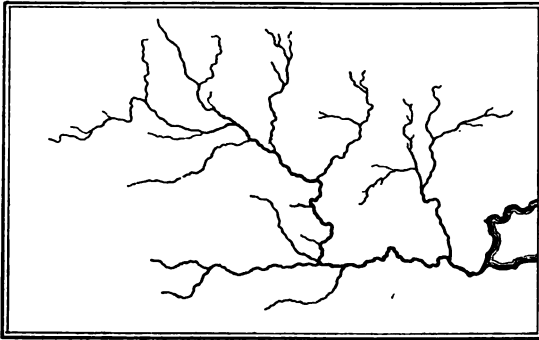
With the summer's welcome hours
From his far-off mountain home,
A little boy came to the seashore,
On the shining sands to roam.

He found the smooth round pebble,
Lying white on the sunny shore,
And carried it back when summer was gone,
To its own old home once more.

—E. G. W. Rowe.

STREAM SYSTEMS.

Let us go back to the rills and study them



"Such a drawing is called a map or plan."

more closely. Here is one. Here it joins another rill. See how much larger the new rill is. Let us find the little divide which

separates these two rills before they meet and run on together. Here come other rills.

Draw lines upon a piece of paper to show just how the rills look. Such a drawing is called a map or plan.

The uneven places on the ground keep the water from flowing down the slopes in sheets. The rills flowing together remind us of the twigs and branches of a tree. The main stream is the trunk. We call these side branches *tributaries* to the main stream. A stream with all its branches is called a *stream system*.

The streams flowing down all the slopes of a valley at last meet at the bottom in the stream which drains the valley. All the water falling in the valley must run down its slopes and flow off in this way. Each little rill has its space of ground to drain.

The land which sends its drainage into one stream, is called the *basin* of that stream. A large stream must receive water from a large basin. The rill basins are very small, but when all these basins are taken together, they form the basin of the larger stream. Very large streams are called *rivers*. You see that a river basin is made of many little basins, just as rivers are made of all the tributaries flowing into them.

Now let us think of some things that we have learned about streams and slopes. We have seen how the tiny rills, running down the slopes, flow together and so form larger rills. These again flow together to make larger streams or brooks, and by uniting at last form rivers.

You will see that every stream has three slopes ; *i.e.*, the side slopes or banks which keep the stream from spreading out and the main slope down which the stream flows. The side slopes form the river *channel*. The main slope tells the stream which way to go.

Rivers have *banks*, too, and a main slope, just as the little

rills have. The ground under the water is called the river bed.

The space between two side slopes is called the channel.

All the land drained by a stream is its basin. The river basin is the same as the valley in which the river runs.

A river with all its branches is a river system. Even the smallest rills belong to some river system.

Rain water does not flow down slopes in sheets, because the slopes are not smooth, and also because the rills quickly cut out for themselves little channels.

These rills join others as they advance down the slopes of a valley and make larger rills until all the water collects at the bottom as a stream. This stream with all its branches is a stream system, and all the slopes drained by any stream form its basin.



THE IMPATIENT RIVER.



It started far up on the hill-
top,

Its shining race to run,
A tiny stream of water,
That laughed in the face of
the sun.

"I want to go faster, faster,"

It sang to itself in glee,

"I want to go faster, faster,
To reach the deep blue sea."

Wider it grew and deeper,
But restless still the same,
It danced and shone in the sunlight,
And sang when the moonlight came.

“I want to go faster, faster,”
It said to the summer sky,
“For surely the sea will welcome
Such a noble river as I.”

So it shone, and sang, and sparkled,
And high its waters tossed,
But alas! when it reached the ocean,
The mighty river was lost.

— E. G. W. ROWE.

WATER IN THE GROUND.

We have learned about the water which runs down the slopes. We have also learned that some of the rain water changes back to vapor. You will remember that there is another part of the water which does not run off down the slopes and does not change back into vapor. What becomes of this part of the water?

Oh, yes, it sinks down into the soil. Have you

ever seen water thrown out upon the ground? What became of it?

Soil is full of small holes or spaces between its particles. We say soil is porous. Water sinks into the soil just as it does into a sponge. It sinks down deeper and deeper until it finds a layer of clay or rock. Water cannot go through these things, so it must flow slowly upon them or collect in hollow spaces below the surface, just as we saw it doing upon the surface.

Have you ever seen a small stream of water coming out of the ground? That was a spring. Can you tell me where there is a spring? Is its water clear or muddy? Why? Have you ever seen a filter? For what do we use a filter?

I will tell you how to make a filter. Take a barrel or very large jar, and put gravel or very clean sand into it. If muddy water is made to run through it, the water will come out clean and clear. This is because the tiny pieces of silt cannot pass through between the grains of sand. They are caught in the small spaces among the fine grains near the top, and the pure water passes on down to the bottom of the filter.

You see now why spring water is clear. The soil acts as a filter. It lets the water go through it, but the silt cannot get through. At last the water soaks down until it comes to the layer of clay or rock which will not let it pass through. Then the water flows along on this layer under ground until it finds a hillside where it can run out. The place where it comes out is a spring.



"The soil acts as a filter."

Spring water is usually clear and cold, because it has been so long under ground, where the sun's heat cannot warm it.

But what shall we do when we want water to drink? It is not always easy to find a spring. If we want to get water without going to a spring, we may almost always find it by digging down deep into the ground.

What do we call such a hole in the ground?

Oh, yes, it is a well. Some wells are dug, some are bored, and some are made by driving a pipe, straight down into the ground.

Try to realize, then, that every time it rains, the ground soaks up large quantities of water, that this water passes downward be-



"It is a well."

low the surface, do; that this water it and becomes it filters farther last, reaching a it cannot pass, it creeps along until it finds an outlet on the side of some slope. Here it comes bubbling forth as a spring.

Springs are often the sources of rivers. No matter where we are, if we dig down far enough, we shall find water. Such holes are wells. We

shall find that wells have been dug almost everywhere upon the land. If there were no wells, we should suffer for the want of water to drink.

Copy these sentences and fill the blank spaces : —

We need — to drink. Water which comes gushing out of the ground is called a —. When we do not live near a spring we can get water by digging a —. We get the water out of a well by means of —, or —.

THE BUBBLING SPRING.

Down in the orchard, a bubbling spring,
 Ripples out from its ferny bed ;
 The water is sweet and cool and pure.
 'Though the brook run dry you are ever sure
 To find that silver thread.

Always the same in the fresh May days,
 Or in the summer's burning heat,
 It bubbles, and flows, and softly sings
 Of the clearest, purest, loveliest things
 In a voice that is low and sweet.

Down in the orchard the children go,
 And beautiful lessons learn,
 As they drink of the water, and list to the song,
 Of the limpid spring as it bubbles along,
 By the side of the waving fern.—E. G. W. ROWE.

POOLS, PONDS, AND LAKES.

Did you ever make a dam out of stones and sticks and mud to keep the brook from running? That made the little stream spread out wide and



A Pool.

get deeper until it flowed over the dam. When larger streams are dammed, they spread out in the same way, often filling wide valleys, and then they form what we call ponds or lakes.

Ponds are small, but some lakes are so large

that men can sail on them for days and not see any land. A lake is formed whenever a stream flowing through a valley, becomes stopped so that it cannot find its way out. Then it rises higher and higher, overflows its banks and spreads out very wide. When the water rises high enough to run over the dam, it flows on.

Did you ever see a lake? Was it a large lake?

Streams which flow into lakes are called *inlets* because they let the water in to fill the lake. Streams which flow away from lakes are called *outlets* because they let the water out of the lakes.

Lakes have several inlets, and yet they seldom have more than one outlet. This is because the outlet always is at the lowest place in the dam, and there are seldom two lowest places. We have already learned how busily the inlets are bringing their silt to fill up the lakes, and how the outlets are cutting out their channels deeper so as to lower the surface of the lakes.

Some lakes are very large. They often cannot be told from the ocean as one looks at them. In mountain regions are often many beautiful deep lakes.



Here is a picture of a lake. See how quiet the water

"Lakes have several inlets and . . . one outlet."

is. This lake is fed by streams which flow down the slopes of the mountains.

It is not a very large lake. The outlet is on this side. On the other side you can see two inlets.

A REVIEW.

We live on the land. The land is solid. It stretches away in every direction. No matter where we go upon the land we shall surely come

to water sooner or later. This water is either at rest in pools or lakes, or it is flowing in streams on the surface.

Over us and all about us is the air. Air is a gas. We breathe it, and we cannot live without it. Clouds float in the air, and when the air moves we call it wind. The air always contains more or less moisture in the form of invisible vapor.

When the air is cooled, it loses some of its vapor. This vapor may appear in different forms, such as clouds and fog, and also dew, rain, hail, snow, and frost.

All the heat comes from the sun. The air helps to collect and hold the heat of the sun and so to keep us from freezing. Part of the water on the land is always changing to vapor, and so the air keeps getting back in vapor what it gives to us in rain and snow.

Part of the water flows down the slopes of the land in rills, which meet and form streams. Another part of the water sinks into the soil and creeps along under ground until it finds an outlet. Openings made down straight into the ground until water is found, are called wells.

If we follow down a slope, we shall at length come to a lowest place beyond which the land slopes upward. Such a hollow is a valley, and since it is the lowest place, water is generally found in it either as a lake or as a stream.

Valleys usually have three slopes: the two side slopes or banks which keep the stream in its channel, and the main slope which shows the stream which way to flow.

Slopes, when almost flat, are called plains. All the slopes which conduct water to a stream make up the stream basin. If we follow up a slope, we shall at last come to a highest place, or divide, beyond which the land slopes downward. Steep slopes of the low divides are hills. Very high hills are mountains. When the slopes of very high land are gentle or almost flat, they are called plateaus.

Long ridges of hills or mountains are called mountain chains.

A stream with all its branches and rills forms a river system. A river system drains all the slopes of its basin. Anything which keeps the water of a stream from flowing is a dam. Dams

may be made by men, or they may be natural. Dams cause the water to rise and overflow the channels of the streams. When dams stop the flow of small streams, ponds are formed. In larger streams they form lakes.



"How does this lake differ from the other?"

Here is a picture of another lake. Do you see the streams flowing into it from the steep slopes on the other side? How does this lake differ from the other shown in the picture on page 78?

Streams do much work: (1) by wearing their beds; (2) by carrying away the fine silt brought

to them from the side slopes by the rain-formed rills. Dropping the heaviest particles first and the finer ones later, they may flow into quiet pools where they drop all their silt and flow on clear.

Streams wear away the soil from the mountains and carry it to the valleys, leaving the mountains bare and giving to the valleys a deep fertile soil. The real work of the streams is to wear down and carry away the land.

Differences in moisture and richness of soil cause differences in the plant life of hills and valleys. These differences in plant life make differences in the animals which go where they can find suitable food.

You see what a very important and useful work the water upon the land does. Here is a little poem which tells us what water does.



A WATER SONG.

Oh, I am everywhere,
Water, water clear,
In the earth and air,
Some way I appear.

In the air I fly,
Rain and snow and dew,
Vapor, fog, and cloud,
In the hailstones too.

On the earth I flow,
River, brook, and sea,—
Everywhere you go,
You find some trace of me.

In springs that bubble up,
In falls that hurry down,
In hidden country woods,
In noisy heart of town.

In the summer time
I fall in gentle showers,
And sparkling dewdrops gleam
Among the leaves and flowers.

New life, new hope, new strength
To all on earth I give;
Without my blessed presence
No man nor plant could live.

In the winter time
I come as ice and snow,
As hail and sleet I fall,
And everywhere I go.—E. G. W. ROWE.

OUR CLIMATE.

Is the weather warm to-day, or is it cold? Is it always like to-day? When do we have warm weather? When cold weather? What is the hot season called; the cold season?

What season comes between summer and winter? What do we call the season between winter and summer? How can you tell spring from fall? When do the buds start and the seeds begin to grow? When do the leaves change color and begin to fall from the trees?

In what season is it necessary to light fires in our houses? Why do we wear thick clothes in one season and thin ones in another?

There is a great difference between the heat of the air in summer and in winter. Do you not remember how we tie up our ears and button up our coats in winter to keep out the cold air, and how hot the wind feels blowing across the fields in summer?

In what form is the moisture which falls in summer? What form does it take in winter? In which of the seasons does the most moisture fall?

Yes, in most places, the greatest amount of moisture falls in the summer season. It is not always easy to believe that more moisture falls in summer than in any other season, because we usually have so much snow upon the ground in winter. But in summer the rain sinks down into the soil or runs off so rapidly that we do not realize how much has actually fallen.

THE SIGNS OF THE SEASONS.

What does it mean when the bluebird flies
Over the hills, singing sweet and clear?
When violets peep through the blades of grass?
These are the signs that spring is here.

What does it mean when berries are ripe?
When butterflies flit, and honey bees hum?
When cattle stand under the shady trees?
These are the signs that summer has come.

What does it mean when crickets chirp?
And away to the south land the wild geese steer?
When apples are falling, and nuts are brown?
These are the signs that autumn is here.

What does it mean when the days are short ?

When the leaves are gone and the brooks are dumb?
When the fields are white with the drifting snows?

These are the signs that winter has come.

The old stars set and the new ones rise,

And skies that were stormy grow bright and clear,
And so the beautiful, wonderful signs

Go round and round with the changing year.

— M. E. N. HATHAWAY.

MORE ABOUT CLIMATE.

If a place is warm all the year, it is said to have a warm climate; if cold, we say it has a cold climate.

Some places are neither warm all the year nor cold all the year. The temperature of the air in such places varies from warm to cold and from cold to warm. Such a climate is variable, but we usually call it a temperate climate.

What kind of climate have we here, cold, warm, or temperate?

When a place has much rain, its climate is said to be moist. If little or no rain, it has a dry climate. Is the climate here moist or dry?

What makes the air warm? Yes, it is the sun. Some times it shines more directly than at others. In the summer the sun at noon is more nearly overhead than it is in winter. Then the earth and air become much warmer. Differences of climate are due to the amount of sunshine which different places receive.

If we walk out in early spring before all the snow has gone, we shall find that sunny slopes have lost their snow first and that buds and seeds begin to grow on such slopes before they do on land which slopes away from the sun. The climate of a place then depends upon the sunshine it receives and upon the direction of its slope.

By and by we shall see how plants and animals depend upon climate. We shall learn that trees keep their leaves all the year in countries having a warm climate, and that in places having a variable climate plants and even some animals must sleep through the long winters. Plants and animals that are not fitted to the climate in which they live are apt to die young, hence we generally find them wonderfully well adapted or fitted to the climate and the surroundings.

OUR NEEDS.

Did you ever see a plant with its leaves hanging limp and withered? What could you give to that plant to make its leaves stand out fresh and green on the stem?



Yes, the plant was thirsty and needed water. You gave water to the plant, and then it became refreshed.

When we awake in the morning we feel hungry. We have eaten nothing since supper the night before, and our bodies have been wearing away during

the night. We need food. You all know what it is to feel hungry. Hunger is the feeling which tells us that we need food.

Plants and animals must have food. The need of food is the principal need we have. But there

"Birds have nests."

are other things which we must have. What, next to food, do we need most?

Oh, yes, we also need clothing. Nature furnishes clothing to most animals, and dresses them in fur, hair, feathers, or scales, as is best fitted to their mode of life.

Where it is always warm, very little or no clothing is needed; but we live where it is sometimes warm and at other times cold. We must have clothing then to keep us warm.

Could we be perfectly happy if we had plenty of food and plenty of clothing, but nothing else? Can you not

think of one other thing which we greatly need?

Oh, yes, we need some sort of a home to live in. That is called shelter. All animals need shelter. Birds have nests; foxes have dens; snakes have holes.



"Foxes have dens."

We should be very unhappy if we had no houses to shelter us in cold and stormy weather.



"Snakes have holes."

We shall soon see that most of the work which men do is in some way connected with food, clothing, or shelter.

FOOD.

Did you ever see a robin hopping along with a worm in his bill? Where did he get the worm? What will he do with it? Are other birds fond of worms?

Did you ever see two little chickens quarreling over a worm and pulling it between them? Did you ever see the hens standing around where a man is digging, waiting to pick up the worms as they were dug out of the ground? Tell me something else that birds eat.

Sparrows sometimes come to the front of my window to pick up crumbs from the ground.

Once I saw a pretty bird with a bright red head, running up the trunk of a tree. Soon he stopped and began to drum on the bark with his bill. He was a woodpecker. What do you suppose he was doing on the trunk of the tree?

Yes, he was drumming on the bark to find a hollow place where grubs might be hidden.

Birds must have food. Some birds eat grain, and some live on berries and seeds.

Do all animals live on the same kinds of food?

Oh, no; every living creature has some kind of food of its own. The mosquito feeds on blood. The dragon fly eats mosquitoes. The squirrel is fond of nuts. The cat and dog feed on meat. The cow eats grass. Grubs often live on rotten wood, and some worms get their food by swallowing earth and feeding on the very small plants which grow in it.



"He was a woodpecker."

OUR FOOD.

Why do we eat? We eat because our bodies are constantly wearing away, and we must make up for this loss by eating food. Food also helps to keep us warm and makes us grow.



Potatoes.

Did you ever think that most of our food comes from the ground? Not only potatoes, sweet potatoes, onions, turnips, and some other vegetables are dug out of the ground, but all the plant food that we eat grows out of the ground.

Plants draw much of their substance from the air through their leaves, but some from the ground through their roots. That is the reason why the farmer puts fertilizers upon the soil. Fertilizers are foods for plants.



Cabbages.

But our food does not all of it come directly from the ground. We eat animal food also. We

eat beef, pork, mutton, fish, and game. But the animals on which we feed get their food from the plants. And the plants get theirs out of the air and the ground. Thus all our food comes directly or indirectly out of the ground and the air.



Strawberries.

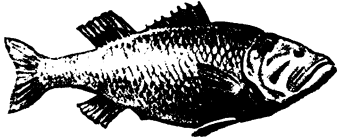


A Melon.

What is our food? We eat a great many kinds of food. Some is dug from the ground. It is mineral food. Of such foods salt and water are the most common. The greater part of our food is vegetable food. It is prepared from plants themselves, as cabbages and potatoes; or it is made from the seeds of a plant, as flour, meal, starch; or it is the fruit of a plant, as strawberries, melons, apples. All the rest of our food comes from animals. From the cow we get milk and beef; from the sheep, mutton; and from the hog, pork. Fish, game, and poultry are animal foods.

Name some game animals. What vegetable food did you eat for breakfast? What animals are raised for food?

CLOTHING.



What kind of clothing has the cat? The fish? The turtle? Nature gives various kinds of clothing

to various animals. The dog would look strange if he had scales like a perch.

A robin could not fly if he was clothed with a shell like the oyster. Most living things



have some kind of clothing. This clothing is always suited to the place where the animals live.



The snake wears a coat of scales which help him

in moving about and make him smooth so that he can creep into very small holes.

Many animals shed their coats in warm weather and grow thicker coats when winter comes. When does the cat's hair come out?



When does the horse get his fresh coat of hair?
When do the hens moult?

Nature is very kind to animals. She thins their coats when weather is warm and gives them thicker coats when they need them. Nature does this for the animals because they do not know enough to take care of themselves.

OUR CLOTHING.

What do we wear in winter; in summer? Of what is our clothing made? Most of the clothing that is worn is made of cotton, wool, silk, or linen.

Where do we get cotton? It grows upon a plant in warm countries. It is part of the covering of the cotton seed.

Linen grows also. It is part of the bark of the flax plant. Did you ever see flax growing?

Here is an interesting little caterpillar. He is



A Silkworm.

not a worm, though some people call him a silkworm. He feeds upon leaves and makes our silk in the form of a covering for himself. It is



"Wool comes from sheep."

made of fine threads such as spiders spin. Men spin this fine covering into floss and weave it into cloth, called silk, for our clothes.

Wool comes from the sheep. You see men in the picture shearing sheep. The wool which



How an Arab dresses.



How a Laplander dresses.

they cut from the sheep's backs will be spun into threads and woven into cloth.

All that we wear comes from the ground as our food did. Cotton and flax grow from the soil, and wool and silk come from animals which feed upon things growing out of the soil.

In different countries people dress differently. Some of these people will look very strange to us because their clothing is so odd. Notice the Arab and the Laplander in the pictures.

SHELTER.



Prairie Dogs' Home.

Nearly all animals must have protection from the rain, the wind, the cold, the heat. Clothing is a sort of protection. But clothing is usually not enough to protect us from the cold

of winter and the heat of summer. A shelter is needed from hot, cold, and rainy weather. Some creatures creep into holes in the ground for shelter. Did you ever find such a hole in the ground where a snake, or a woodchuck, or a chipmunk had made his home?

Some creatures build nests, and some build houses. Birds build nests not to



The Oriole's Nest.

shelter themselves, but their eggs and their young ones. The robin uses a great deal of mud in building her nest. The oriole uses hair, thread, and long grass.

In the pictures are shown some kinds of shelter which various animals build for themselves.

Did you ever turn over a big flat stone in the meadow? What did you find under it? Find out some creatures which make their homes under logs or under boards lying on the ground, or inside the bark of rotten logs in the woods.



Cliff Swallows' Nests.

Fill the following blanks according to your own observations :

The rat finds a shelter in a ——. The ant lives in ——. Snails creep into their ——. The earthworm finds a shelter in ——. Sow bugs live ——. The bluebird builds a — of ——. The —, —, and — find homes in holes in the ground. —, —, and — live under stones.



American Homes.

OUR SHELTER.

But we need protection too. We must have houses to shelter us from the rain and wind and cold. Of what are our houses made?

Yes, they are made of stone, brick, mortar, iron, wood, glass, paper, and many other things.

What materials used in building our houses come out of the ground? Which grow out of the ground as plants or parts of plants? Make a list

of all the materials used in building houses and tell where each comes from.

But houses everywhere are not like our houses. The homes of differ-

ent people differ as greatly as their clothing and food. If you should travel in distant lands, you would find many curious people eating strange



African Homes.



Japanese Homes.

foods, wearing very strange garments, and living in very strange houses. But wherever you go, the people will be found eating food of

some kind, wearing some sort of clothing, and dwelling in some kind of homes.

THE OCCUPATIONS—FARMING.

We have just learned that we have many needs. Everybody must have food and clothing and shelter. Hence, in order to supply these various wants, people have many different occupations.



"This man is a truck farmer."

See this man driving along the road with a wagon load of vegetables! Where did he get these vegetables? Where will he take them? Why?

This man is a truck farmer. He raises vegetables for the market. He is going to town to sell his produce. What kind of vegetables do you think he has? Do you not see the fine level farms along the road? Tell what you know of plowing, planting, cultivating, and gathering vegetables. What do farmers raise besides vegetables?

We could scarcely live without the farmer. He produces nearly all our food. The farmer gets food for us from the soil. This work of the farmer is called farming or agriculture. Agriculture is the getting of food from the ground by tilling the soil.

Copy these sentences, and fill the spaces properly : —

The farmer — the soil. He plants — in the ground. He gathers his — and takes them to — for sale. The farmer raises —, —, —, and —, on his farm. The farmer's work is called —. The farmer plants in the —, he gathers his harvest in the —.

Write answers to these questions : —

What does your father do? What does your nearest neighbor do? Make a list of what all the boys' fathers do. What will you do for a living when you grow up? Do you know of anybody who has nothing to do? What tools does the farmer use in his work? What use does he make of each tool?

STUDY OF A FOOD GRAIN—WHEAT.

TO THE TEACHER. — Procure some grains of wheat. Pass them about the class for observation. This should familiarize every pupil with the form, color, size, and taste of wheat. Let pupils draw the kernel as it appears to them.

Then plant some in soft moist soil and place a few seeds in wet cotton, where the growth may be observed from day to day. The seed will gradually swell up, and after a short time a radicle will push its way out of the husk, and from this tiny roots will soon begin to grow. Then through a very small slit in the seed just above the radicle, two very slender green leaves, pressed flat together, will emerge. Then growth becomes more rapid. Have pupils make sketches every two or three days.

If possible, make observations on wheat fields, on plowing, harvesting, threshing, etc., or read of these operations to the pupils. Study other cereals, as corn, rye, barley, oats, and rice, and require similar descriptions.

FOR THE PUPIL. — Write answers to the following questions, using complete statements: —

How long is a wheat kernel?

Of what color is the outside? The inside? How do you get wheat “gum” from the wheat?

What does the seed need in order to grow? What did you do with the wheat seed? What had happened after it had been planted three days? After one week?

How is wheat got from the grain? What is straw? Chaff?

What does the miller make from wheat? What do we make from flour?

THE OCCUPATIONS—STOCK-RAISING
AND DAIRYING.

Here is another picture. See how hilly and stony the land is. It is hard to till the soil here. The slopes are so steep and there are so many rocks in the soil. This is a poor place for farming, but it is a fine place for stock-raising.

In hilly countries where the land is too rough



"A fine place for stock-raising."



A Sheep Pasture.

and rocky for farming, and also in other places where there is not much rain but plenty of pasture land, people raise cattle and sheep. They raise these animals and sell them to butchers for our food. They also use the milk for making butter and cheese. Men who raise cattle and sheep for market are called stock raisers. Those who make butter and cheese and sell milk are called dairymen. Stock-raising and dairying are very important occupations.

The farmer supplies us with vegetable food, but the stock raiser and dairyman furnish us with meat, milk, butter, and cheese. Most

farmers also raise some stock for food. Wherever we find land which cannot be cultivated but where grass will grow, we may expect to find many people engaged in stock-raising.

Copy these sentences and fill the blank spaces with the right words:—

The stock raiser raises —, —, —, and —. He sells the —, —, and — to the butcher. When the butcher has killed and dressed them their meat is called —, —, and —. The butcher sells the hides to the —. He makes these hides into —. The shoemaker buys the — and makes it into —. The dairyman uses the milk to make into — and —. Stock-raising and dairying are usually carried on in the — country.

STUDY OF A DOMESTIC ANIMAL—THE PIG.

TO THE TEACHER. — Let the pupils observe, if possible, a living pig. Where this is not convenient, use pictures of pigs, or visit some market where the bodies may be observed. The following features merit special study:—

1. *The body*: Its shape, size, color, and general appearance.
2. *The skin*: Its texture, bristles.
3. *The head*: Its shape, and appendages; *i.e.*, ears, eyes, snout, tusks.
4. *The limbs*: Front and hind legs, their length, feet, number of toes.
5. *The tail*: Its size compared with the body, its length and shape (usually curled).

6. *Habits*: (a) Of eating, (b) of sleeping, (c) of grunting and squealing, (d) lack of cleanliness.

7. *Uses*: (a) As scavengers, (b) as food.

Study the cow, horse, and sheep in a similar manner.

FOR THE PUPIL. — Write answers to the following questions, using complete statements: —

Did you ever see a pig?

Where was it? In what did it live? What did it eat? Out of what did it feed? How did the pig act while eating? Of what colors are pigs? What sort of clothing have they? Of what shape are a pig's ears? Describe a pig's eyes and nose. How many toes has a pig on the front feet? On the hind feet? What noises do pigs make? When do they squeal? When do they grunt? Of what use are pigs while they live? What use do we make of them after they have been killed? What is pig flesh called?



THE OCCUPATIONS—LUMBERING.

In the next picture you may see men working in the woods. Can you tell what they are doing? Why are they cutting down those huge trees? They will cut the trees down and haul them away to the sawmill. The logs will be sawn into boards and timbers. From them will be made houses, boats, and many other things.



"These men are making lumber."

These men are making lumber. They are called lumbermen. Their work is called lumbering. Many men work all the time at lumbering. Sometimes the logs are cut in winter and hauled or dragged to the streams. When the ice melts, these logs are floated down to the sawmills where they are to be sawn. Men who go along keeping the logs in the streams are called loggers, and their work is called logging.

Sometimes the logs are bound together and so made to float in huge rafts. All this work of getting lumber is called lumbering.

STUDY OF TREES.

TO THE TEACHER. — Study trees first in their winter dress, so that the mode of branching may be more apparent. Study them after the following plan: —

1. *Trunks*: Undivided, partly divided, much divided.
 2. *Bark*: Its thickness, color, manner of breaking off.
 3. *Interior*: Bast, sapwood, dead wood, rings of growth, pith.
 4. *Branches*: Their position relative to trunk, whether hanging, sagging, horizontal, arching, ascending, or erect.
 5. *Buds*: Their shape, size, position on the twigs; also their bud scales and other devices for protection of the young branch, such as down, wax, or wool.
 6. *Leaves*:
 7. *Flowers*:
 8. *Fruit*:
 9. *Seeds*:
- } Should be carefully described.
10. *Uses*: Of bark, as cork, tanbark, cinchona, and logwood.
Of wood for buildings, cabinet work, and other purposes.

FOR THE PUPIL. — Write answers to the following questions:

Name a tree having an undivided trunk. Is the locust such a tree? What sort of trunk has the pine? Name a tree whose branches sag. Name one whose branches droop. What trees have horizontal branches? What protects the buds of the horsechestnut? Why does the bark of trees crack and peel off? What is sapwood? Where is it? What causes the rings in wood?

THE OCCUPATIONS — MINING.

But besides farming, grazing, and lumbering, there are other ways of getting things to supply our wants. Here is a deep hole in the ground. It is not a cave. It is a mine. Men have dug this mine in order to get at the minerals which are found under the surface of the ground.



"These men are called miners."

We get coal, iron, copper, zinc, lead, gold, and many other minerals from mines.

These men are called miners. Their labor is called mining. See the little lamps on the miners' hats? It is so dark in the mines that the men must have lamps to give them light. They have to work with both hands. That is why they have their lamps upon their hats. Mining is a very hard and dangerous occupation.

There are some minerals which lie near the surface. To get minerals of this kind, men do not need to dig mines, but only to take off the



"We call such a place a quarry."

top soil and earth and lay the mineral bare. Then they can easily remove it. We call such a place a quarry, and this way of getting minerals is called quarrying. Marble, granite, sandstone, limestone, and slate are quarried.

Copy these sentences and fill the blank spaces properly : —

Miners dig deep holes called — to get minerals. Quarrymen get — for us. Mines are —, but quarries are —. Salt, coal, and gold come from —. Marble, slate, and sandstone come from —. Miners wear lamps on their —.

THE OCCUPATIONS—FISHING.



"The men are fishing with a net."

Here are some men in a boat. The boat is small. The men are fishing with a net. We hope they will make a big haul. These men go fishing every day. It is their occupation, and in this way they make a living.

In some places there are many hundreds of people who labor at fishing. Such men are called

fishermen. Their work is of course called fishing. Is it not a dangerous business? When they have caught the fishes, they clean, salt, and dry them for the market.

The men in the picture sometimes go out to sea and fish for cod, mackerel, and herring. Men who go far away on long voyages in search of whales are called whalers, and their labor is whaling. Others go in search of seals. This is called sealing.

Copy these sentences and fill the blank spaces properly : —

Men who go out upon the water in search of fish, are called _____. Their business is _____. They catch _____, _____, _____, and _____. They dry these _____ and cure them. Men who go in search of whales are called _____. Fishermen always live near _____. They fish with _____. Nets are made of _____.



THE OCCUPATIONS—MANUFACTURING.

The farmer, the grazier, and the fisherman are getting food and clothing for us from the ground or out of the water. The lumberman, the miner, and the quarryman are getting materials for our shelter and food and fire.

Such things are called raw materials. They come directly from the earth. Very few of them are fit for our use when they come fresh from the land or water. Something must be done to these raw materials before they can be used.

The wheat must be ground into flour, and the flour must be made into bread. The flax must be spun and woven. The iron ore must be smelted and made pure. The timber cut by the lumbermen must be made into houses and furniture. The stock of the stock raisers must be turned into beef, mutton, or pork. A great deal of milk or cream must be churned into butter or made into cheese. The stone from the quarry must be cut and made into buildings. Even the coal and the salt must be broken, sorted, and sifted before they can be ready for use.

Thus, many men are required to change these raw materials into prepared ones. This work is called manufacturing.

Great manufactories are engaged in packing, salting, canning, and preserving fish, lobsters, and oysters, which the fishermen get for our food.



A Great Manufacturing City.

Others are equally busy working over minerals into various useful articles.

You can now understand that great numbers of people earn their living by farming, stock-raising, lumbering, mining, quarrying, fishing, and manufacturing. These are the chief occupations of man.

Manufacturing is ——. A factory is ——. —, —, —, —, and — are manufactured articles. Shoes are made of —. Leather is made of —. Candy is made of

——. My coat is made of ——. This house is made of ——.
Bricks are made of ——. Rags are used for making ——.

MAKING FLOUR.

Here is a picture of a great farm. It is near the end of the harvest time. The wheat has



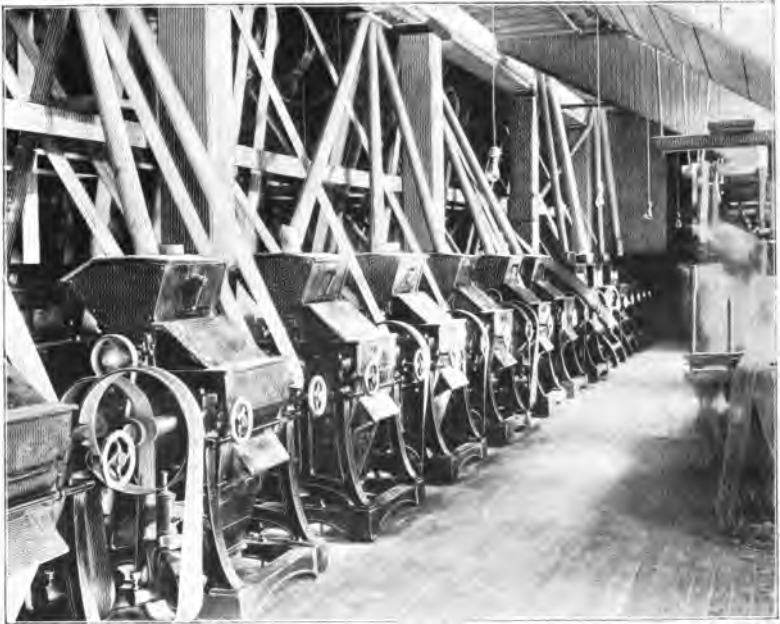
"They are thrashing the wheat."

been cut down and many men are at work in the field. Do you know what they are doing?

Oh, yes, they are thrashing the wheat. Near the thrasher stands a load of wheat. The

sheaves of wheat are thrust into the thrasher. The grain is beaten out and separated from the chaff and straw. See the pile of straw.

Some of the men are filling bags with the grain as it pours out below. Near us is a man driving a four-horse team. He has a load of grain.



"The interior of a flour mill."

In this picture we see the interior of a flour mill. The grain is taken to the mill to be ground.

It must be crushed very fine between iron rollers. Then it is sifted through fine silk cloth. At last it is put into barrels or sacks and sent to market. We buy it to make into bread.

Write answers to these questions:—

From what is flour made? Name three things which we eat that are made from flour. What is meal? How is bread made? What color is flour? Is raw flour good to eat?



MAKING CLOTH.

Here is another picture. It is of a cotton field. Do you see the cotton pickers at work? They

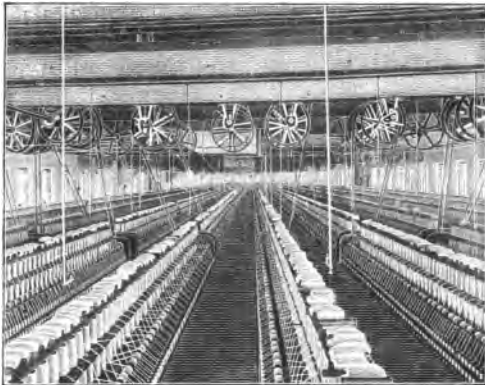


"Do you see the cotton pickers at work?"

are gathering the cotton from the cotton plant. They pack it in large baskets and carry it to the gin.

The cotton gin is a machine which picks the seeds from the cotton. Then the cotton is pressed into bales and sent to the factory.

In this picture we see the inside of a cotton factory. These large machines are for spinning the cotton into threads. There are many girls and boys who work in this cotton factory tending the machines.



"These machines are for spinning the cotton."

When the cotton has been spun into threads it is woven into cloth.

On the next page is a picture of other machines. These machines are called

looms. The threads are put into the loom in a very peculiar way. Then more thread is placed in an instrument called a shuttle. The shuttle

moves to and fro between the threads in the loom and so the cloth is woven.

In olden times people wove cloth by hand. Now this is done by machines. In some factories cloth is woven from wool. In others it is woven from silk. Other kinds of cloth are made from flax, hemp, and the hair of various animals.



"These machines are called looms."

Name five different kinds of cloth. Name five kinds of cotton cloth. How is cotton obtained? How is the fiber taken from the seed? Tell how it is spun. What is a loom? For what is it used? How was cloth formerly woven? How is it woven now? Where do we get silk? Where do we get wool? Where do we get linen? What are ropes made of?

STUDY OF PLANTS—COTTON.

TO THE TEACHER.—In studying the cotton plant, very little can be done with the plant itself, owing to its limited geographical range; but cotton in the pod is not hard to get, and pictures of cotton in all stages of its growth can easily be had.

It is recommended, therefore, to study about cotton as much as possible from these various sources, and also to encourage the pupils to study the hollyhock, marsh mallow, and other malvaceous plants for comparison.

Cotton fiber should be seen under the microscope, and compared with fibers of silk, wool, flax, and hemp. Talk about the gin and the loom, and find pictures of them.

Let flax and hemp be planted in the schoolroom and studied as they grow. It is suggested, also, that samples of various fabrics made from these textiles be collected, examined, and labeled for future use.

FOR THE PUPIL. — Where does cotton grow? What part of the plant is cotton? What other plants have a growth on the seed? Of what color is cotton? Describe a fiber of cotton.

How is the cotton removed from the seed? How is it made into cloth? Name five kinds of cotton cloth.



MAKING IRON AND STEEL.

On page 111 of this book is a picture of the inside of a mine. See how dark it is. The men have small lamps on their hats.

The mine is an iron mine, and the miners are digging the iron ore. The ore will be taken out of the mine and carried to a furnace to be smelted or purified; for the ore is not pure iron.



"Do you see the melted iron running from the furnace?"

In the furnace the ore is heated with coal and limestone. These take out the impurities. Then the iron melts and flows out of the furnace.

Do you see the melted iron running from the furnace? It runs into small trenches in the sand on the floor. It cools there. When cold, it is called "pig iron." Pig iron is rough and coarse. It must be melted again and worked with machinery to change it into steel.

Name ten things made of iron or steel. Tell one thing for which each is used. What is ore? What must be done to the ore to get the iron out? What things in the schoolroom are made of iron? What farmer's tools are of steel? What shoemaker's tools are steel? What miner's tools are steel?

THE OCCUPATIONS—TRADE OR COMMERCE.

Is flour made where you live? Is steel made here? Are there any cotton factories near you? What is the principal business where you live?

Everybody must have flour and cloth, and tools of iron. But these things are not made everywhere. Some one must take these things from where they are made and carry them to other places where they are needed.

The farmer raises more fruit and vegetables than he needs. He sells them to the produce man for money. The buyer sends them to the city where there is a ready market for them.

The mines are among the mountains. The fishes are in the sea. Timber grows in the woods. Some one must carry raw materials from where they are found to the places where they are to be manufactured. Some one must

bring back manufactured articles to the places where people need to use them. This is called trade or commerce. The trader takes what is not needed in one place and carries it to another place where it is needed.

What did you eat for dinner? How many of these things are found where you live? Where did the salt come from? Where did the pepper come from? Where do fish, beef, olives, coffee, chocolate, sugar, and tea come from? What is the table made of? Does it grow here? Of what is the tablecloth made? Does it grow here? What do you wear on your feet? Is it made where you live? Of what is your coat made? Fill blanks: My dress is made of ——. It comes from ——. Pearl buttons are made of ——. They come from ——. Sugar is made from ——. It grows in ——.



TRANSPORTATION BY LAND.

The next picture is of a very busy city. It is a manufacturing city. You can tell that by the great number of factories and shops. See how the black smoke pours out of the many tall factory chimneys.

But this city is also a commercial city. The people are engaged in many kinds of trade. You may know this by the many boats and trains of



"A very busy city."

cars to be seen in the picture. These cars and boats bring raw materials here to be made into various articles. They carry away these manufactured articles to distant places where they are needed.

There are two principal ways of carrying articles from one place to another. The first way is by land. The second way is by water.

In our country commerce on land is mostly carried on by railroads. Both people and freight

are transported in this way. In some mountainous countries men travel by being carried on the backs of other men.

Mules and reindeer are used in some countries instead of horses and oxen. In cities cars may be seen drawn by horses or propelled by cables or electricity.

In very cold countries dogs are used to draw sleds or sledges over the ice and snow. In very hot sandy countries, goods are loaded upon the backs of camels. Large numbers of camels are used to carry things across the great dry plains.



TRANSPORTATION BY WATER.

When goods are to be taken on the water, boats are used. There are many kinds of boats. Some go by means of steam. Others sail by wind. Such boats have sails. In the picture on the next page you see many kinds of boats. River boats have huge paddle wheels on each side or a large paddle wheel at the stern.

Canals are large ditches dug across the land so as to join two streams or two lakes or any two

bodies of water. Where they change their level in going up or down a slope, locks are built to hold the water and keep it from flowing.



"There are many kinds of boats."

Canal boats are long and narrow. They are usually drawn by horses or mules.

Long, flat boats called barges are used for carrying coal, brick, stone, lumber, and other heavy articles. Small steamboats are used often to tow larger boats into port. Such boats are called tugs. In one of the pictures two tugs may be seen.

In small streams only very small boats can be used. Such boats must be paddled or rowed through the water. In this picture you may see two canoes loaded with skins. There are trappers in these canoes. They will take their skins to market.

Huge rafts of logs are sometimes made to sail by putting sails on them like the sails of a ship. The wind then carries the rafts where the logs can be sawn up into lumber.



"Such boats must be paddled."

Goods are not transported now as they used to be. Before steam was used, sailors had to depend on the winds. Sometimes it took many weeks to make journeys which can now be made in a few days with the use of steam.

Have you ever been away from home? How did you go? Write all you can about the journey, telling how you went and what you saw on the way.

What are cars? What is a train? What is used to draw a train of cars? What makes it go? Describe a stock car; a flat car. Name five things carried in the cars.

WHITE PEOPLE AND BLACK PEOPLE.

Here is the picture of a little boy. His eyes are blue and his hair is light colored and wavy.



Arthur.

His name is Arthur. Arthur's father is a merchant. He owns a large store in the city. Arthur goes to school and reads in the second reader. He plays marbles, and ball, and all the other boys' games in their season. See what red cheeks he has! It is

because he has been running all the way to school.

Arthur has a sister Grace. Grace is a very pretty child, with light hair, blue eyes, and a fair skin like her brother. Grace plays with dolls in the house, but Arthur would much rather fly his kite or play ball in the meadow.



Sambo.

Here is another boy. Does he look much like little Arthur? Did you ever see a boy who looks like this one? Let us give this boy a name. We will call him

Sambo. Sambo's skin is not white. His skin is dark brown, almost black. We say Sambo is a colored boy. Some people would say he is a negro. The word negro means "black," and is often applied to black people.



"In Africa they are almost wild."

Sambo's mouth is not like a white boy's mouth. His lips are thicker. His nose is broader, and it is quite flat. He has thick curly hair. It curls up very tight and looks like wool. His forehead slopes back. His teeth are very white.

Most of the negroes in the world live in a very hot country far across the sea. A long time ago some negroes were brought here as slaves. Their children and grandchildren were kept as slaves. That is how there came to be so many colored people in this country. Now they are all free.

In Africa where the negroes first lived they are almost wild. But here, where we know them, they live very much as white people do. They have schools and churches, shops and stores, and they make good citizens.

Most of the negroes in our country live in the South, where they were once slaves. Sambo goes to school. When he grows up he may be a barber, or a coachman ; or he may have a little farm and raise vegetables for market.



RED PEOPLE AND YELLOW PEOPLE.

Did you ever see a red man? We call the red man an Indian. The Indians once lived here where we do. They were very wild. They lived in strange huts made of skins and the bark of trees. These tents were called wigwams.

The Indians are called red men because their skin is reddish in color. Indians have very strange names. Here is one whose name is Black Bear. See what high cheek bones he has. His nose is hooked, and his eyes are very keen. His hair is long, straight, coarse, and very black.



Black Bear.

The red man, when in his own home in the woods, is a great hunter. He is also fond of fighting. He wears

feathers in his hair and sometimes paints his face. Some of his clothes are made of skins.

Black Bear's wife is called a squaw. His babies are called papooses. The squaws do all the work while their husbands hunt or fish.

See the papoose in the next picture. This papoose is tied up in a bundle against a board and strapped to its mother's back.

Many years ago all this country of ours was inhabited by the red men. When the white people came across the sea, they found many In-



A Papoose.

dians here. At first they lived in a friendly way with the Indians. After a while there were quarrels between the white people and the Indians about the ownership of the land. The whites were stronger and had better weapons. The red men were driven away to the far west, and

now only a few remain in this country.

What a funny-looking fellow in the next picture! He is not a negro like Sambo, nor is he a red man like Black Bear. He is a Chinaman. His skin is neither red, nor black, nor white. He has a yellowish skin. His name is Sing Lee. He shaves his head, all but the crown, and lets the hair on the crown grow long. He braids this hair into a long tail or cue.

At home Sing Lee lives differently from us. His home is a very funny house. His food is



"His name is Sing Lee."

mainly fish and rice. In his own land much tea grows, and the Chinaman raises and gathers the tea and sells it. In our own country the Chinaman is employed mostly as a laundryman. The Chinese wash and iron our clothes, and some people have them for cooks.

Sing Lee dresses very oddly. He wears a long gown and loose trousers. His shoes are very short and blunt, with wooden soles. His



A Chinese Boy.

sleeves are wide and loose. His clothing does not seem to fit him very well. His writing is very strange.

The little Chinese boy whom you see in this picture has a very pleasant home. His parents are not poor like Sing Lee. See how prettily he is dressed. When he is a little older he will

go to school; and when he becomes a man he may be a rich merchant or an officer in the army.

A white man's hair is ——. His eyes are ——. His skin is ——. A black man is called a ——. This word means ——. The negro's lips are ——. His hair is — and —. The negro came from —. The red man is called an —. He lives in a — made of —. His children are called —. The Chinaman comes from —. He wears his hair in a —. He eats — and —.

唐人衣棠館

Chinese Writing.

PEOPLE LIVE TOGETHER.

You have seen how different people are: Black, red, yellow, and white. But these are not the only ways in which people differ. They differ according to their occupations. The farmer and the sailor are very unlike each other. Their work makes them different. It is so with the merchant and the mechanic.

Climate and slope have much to do with mak-



A Village Street.



A City Street.

ing people different. People do not live alone. They are fond of society. They are usually found living together in communities. Such communities are called villages, towns, or cities.

Villages are built in places where the people can find work to do. In villages near the sea, the people are usually engaged in fishing or commerce. Among the mountains, the villages may be built by people who are engaged in mining or lumber-

ing. Other towns grow up where the other occupations can be practiced.

As more and more people come to live in a village, more houses must be built. Streets must be laid out. Water works, lights, and public buildings must be provided. Then parks are laid out and the village becomes a city. The principal difference between a village and a city is its size.

If people were to live alone, each man would have to be his own farmer, his own fisherman, his own butcher, his own carpenter. In short, each man would have to do everything for himself. But where people live together, one man does one kind of work and others do other kinds, and then they exchange their wares. Where each person has only one kind of work to do, the work must be better done because the man will become more



An Indian Village.

skillful. This way of doing is called "division of labor." Among savages, there is no division of labor. The more civilized people are, the more their labor is divided.

A few people living together form a village. More people form a city. Many villages and cities, having much trade with each other, are united, together with the country between them, into a larger community called a state.

GOVERNMENT—HOME.

What do we call the place where we live? Yes, we call it our home. Do all boys and girls have homes? Are all homes alike? Who live together in the houses which we call our home? Yes, there are father, mother, brothers, and sisters living together in our homes. Is it not pleasant to be at home when all the family are there? How we laugh, and play, and run about when we are all at home.

Every one at home has some work to do. What does your father do? What is your mother's work? The girls help mother, and the

boys help father in the work about the home. What do you do when you are at home?

Can you always do just as you please? Why not? When the children become unruly, who checks them? When they quarrel and do other naughty things, who punishes them? Who protects the children from harm? It is not well for children always to do as they please, for sometimes children become naughty, and need to be punished, and sometimes there are lazy children who must be made to do their share of the work at home.

You see, then, that some sort of government is necessary in every home. Father and mother are the officers who execute this government of the home. Both parents and children are the members of this government. This government ought to be such as to benefit all its members.

Parents have a right to be obeyed, and they have a right to expect the help of their children. Children have a right to expect food, clothing, and shelter from their parents. They also have the right to be educated. It is our duty to love and obey our parents.

GOVERNMENT—SCHOOL AND COUNTRY.

We have seen that government at home is very necessary. Without it, our homes would become very unpleasant places to live in. Father and mother must use all their authority to govern the home so that the children may grow up to be good men and women.

But the home is not the only government under which we live. Whenever people come together in large numbers, there is need of some other kind of government. Can you not think of another kind of government somewhat like the home and yet very different from it?

Oh, yes, it is the school. The teachers are the officers, and the pupils are the members. Each has certain rights and duties.

What are some of your rights in school? Your duties? What are the janitor's duties? In some schools the teacher appoints pupils to help her at times. Such pupils are called monitors. What are the duties of monitors?

There are other kinds of government higher than the school. The children have no part in



The Capitol at Washington, where the Laws of our Country are Made.

these, for they are governments of the people. Men and women as well as children must have government over them. There are bad men and women as well as good ones.

Government is needed to make and enforce laws for the protection of good people against the acts of the bad. So parents make rules for the home in order that the good boys and girls shall not be wronged by the bad ones. If children are naughty, they are punished by

their parents. It is right that this should be so. If people are bad, they must be punished by the government.

Rules made by the government for the protection of the people are called laws. Laws are made against theft, house breaking, fire spreading, killing, and many other offenses.

There are many kinds of government. Some of these kinds are the town or township, the county, the state, and the nation. The township comes next to the school.

Name the township in which you live. The township's officers are a justice of the peace, a constable, an assessor, and in some places a tax collector and town clerk. Can you tell the duties of each of these officers? What are taxes for? Why must there be taxes? Name something for which the tax money is spent.

We shall soon learn much about our country. The United States is the highest government under which we live. We love it best of all because it is our native land.

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